

CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society
Of America

Vol. XXII NOV.-DEC., 1950 No. 6



FIG. 63. *Haworthia coarctata* is one of the hardiest of the Haworthias. It is easily propagated and forms huge clusters. Haselton photo.



CACTUS AND SUCCULENT JOURNAL

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Vol. XXII

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Reprint of "Stachlige Wildnis"

By Curt Backeberg. The first printing in 1943 contained 422 pages plus 100 pages of photographs. The new edition has been shortened to make a popular edition but it still contains 110 photographs similar to those on pages 9 and 135 in Cactus and Succulent Journal of America. Although this book is in German, it is the most complete travelogue of a collector in Mexico and South America. Abbey Garden Press has secured exclusive sale in the U.S.A. Price will be approximately \$4.00 plus postage. Send us your order now and we will have a copy forwarded from Germany and bill you after shipment (price not to exceed \$5.00).

EDITOR'S NOTES

This issue completes Vol. XXII of the JOURNAL. Once more we wish to thank the many contributors who make this magazine possible. It is quite remarkable that not once in twenty-two years have we run out of material for publication. In fact, we always have articles waiting for publication and it is sometimes embarrassing that we cannot publish all of the material as received. Let us keep this healthy condition by supporting the JOURNAL as in the past.

Once more we repeat that most of the amateur material can be gleaned from books and we therefore devote most of the JOURNAL pages to current articles. Many of our readers have stated that each time they re-read the JOURNAL they derive additional knowledge from its pages and that while many of the articles were too scientific at the first reading, now they have a real meaning.

Dealers are beginning to stock more and more of the collectors items. Plant collectors are finding more and more new species; for instance, as we go to press we have just received descriptions of eight new species from Bolivia. All the better magazines are carrying articles on cacti and the other succulents; did you see the color cover of the November "Flower Grower?" The reproduction of a group of Echeverias was one of the finest we have ever seen and E. J. Alexander of the New York Botanical Garden is to be congratulated. The same issue of the "Flower Grower" contained an article by our friends the Proctors of Phoenix, Arizona; the title of the illustrated article is "Desert Glamour on Your Windowsill." All this publicity shows the growing interest in succulents.

This issue of the JOURNAL announces five new books and several more are in production. If you have not ordered your copy of the "Aloes of South Africa" please do so as soon as possible (\$14.50); we had to purchase \$1000 worth of this edition to in-date and remember that books purchased through this office help to support the JOURNAL.

The majority of our members will receive a notice of expiration with this issue; please renew promptly before the Christmas rush and it will help your Editor materially.

Please do not send in your JOURNALS for binding. We have not been able to make satisfactory arrangements with a book-binder.

Take a part in your JOURNAL and let's make 1951 the best year yet.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUESTED BY THE ACT OF CONGRESS OF AUGUST 24, 1912. Of Cactus and Succulent Journal, published bi-monthly at Pasadena, for October, 1950. State of California, County of Los Angeles.

Before me, a notary in and for the State and county aforesaid, personally appeared Scott E. Haselton, who, having been duly sworn according to law, deposes and says that he is the Editor-Publisher of the CACTUS AND SUCCULENT JOURNAL, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Scott E. Haselton, Box 101, Pasadena.

2. That the owner is: CACTUS AND SUCCULENT SOCIETY OF AMERICA, INC.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None. Cactus and Succulent Society is a nonprofit organization and issues no stock.

SCOTT E. HASELTON.

Sworn to and subscribed before me this 30th day of September, 1950. D. Y. NAKAMURA, Notary.

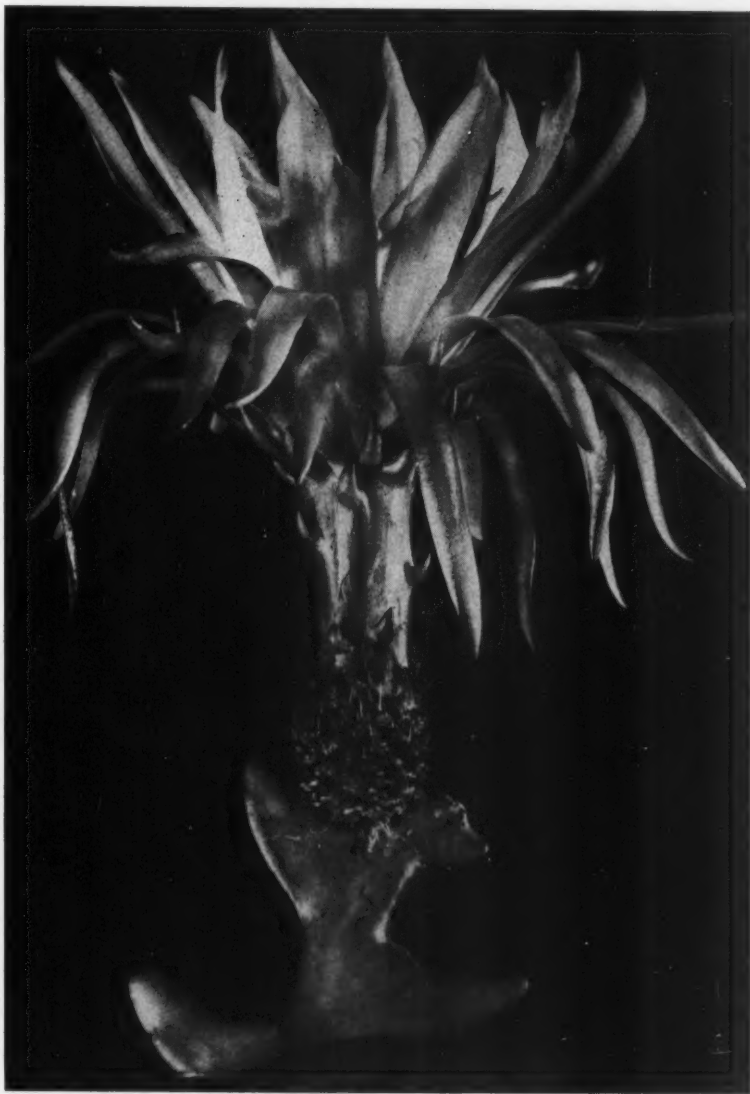


FIG. 64. *Cryptocereus Anthonyanus* n. sp. side view of flower.

A NEW CACTUS GENUS FROM MEXICO

By E. J. ALEXANDER

Novelties continue to come from Mexico. This time it is a rather singular plant which appears to be a missing link between the Hylocereanae and the Epiphyllanae.

Four years ago, Mr. T. MacDougall brought back from the forests north of Ocozocoautla in Chiapas, cuttings of what appeared to be a new

species of *Epiphyllum* in the group containing *E. anguliger* and *E. Darrabii*. It was noticed that the pads were of thicker texture than is usual in *Epiphyllum* and that there were tiny spines in the areoles. This coupled with a climbing habit of growth indicated a real novelty, but how novel was never even dreamed of until a

plant bloomed in June of this year. Of cuttings given to several people, it remained for one given to Dr. Harold E. Anthony of Englewood, N. J., to be the first to bloom, and, in the kind of flowers it produced, to show us that the phylloid form of stem can no longer be a distinctive feature of the Epiphyllanae. Of course, the Hylocereanae contain one phylloid type, the rare and isolated *Strophocactus* of the jungles near Manaus, Brazil, but now we find in North America a plant which much be considered as of similar ancestral derivation, but certainly generically distinct. This strange cactaceous plant is now presented to the cactus world, and named for the fan whose care has brought it into its first flowering in cultivation. The long time it has remained hidden in the forests of Chiapas makes its generic name peculiarly fitting.

***Cryptocereus* Alexander gen. nov.**

Plantae scandentes, ramis complanatis, crassis (4-6 mm.) lobatis profunde, areolae depressis, ad apicem gibberis ventralis et spinibus brevibus; flores grandes 12±cm.), nocturnis ad areolis nascentis; ovarium rotundum bracteis

minutis ovatis in axillis lanatis, setosis et spinosis; perianthii tubus teres, limbo brevior; extrinsecus squamis parvis ovatis patentibus acutis; perianthii segmenta numerosa, late linearia acuta, exteriores recurvata, interiores erecto-patentes; stamina numerosa in serieis paucibus in fauce tubi inserta, filamentis gracillimis, brevissimis (1.5 cm.), antheris oblongis; stylus corpulentus staminibus longior, stigmatibus 10-12 longis et robustis; fructus ignotus.

***Cryptocereus* Alexander, nov. gen.**

Climbing plants with complanate, thick (4-6 mm.) deeply lobed branches, the areoles slightly sunken at the top of a hump developed at the base of the upper side of the lobes, and bearing three short spines. Flowers large, nocturnal, arising from the areoles; ovary orbicular with minute ovate bracts bearing in their axils short wool, bristles, and a few short, stout, translucent spines; perianth-tube terete, stout, shorter than the limb and bearing on its outer surface a few spreading, acute, ovate bracts, the lower ones bearing wool and a few bristles in their axils, the upper ones short wool; perianth segments



FIG. 65. *Cryptocereus Anthonyanus* n. sp. front view of flower.



Fig. 66. *Cryptocereus Anthonyanus* n. sp. in natural habitat, showing the spreading head of the plant 20 feet up in a tree.

numerous, broad-linear and acute, the outer ones recurved, the inner erect-spreading; stamens numerous, inserted in several approximate series in the throat, the filaments slender and short (1.5 cm.), anthers oblong, cordate at the base; style very stout, much longer than the stamens, with 12-14 long stout stigmas; fruit unknown.

***Cryptocereus Anthonyanus* Alexander, sp. nov.**

Ramis in fasciculis secundum caules scandentes, ad metro vel plus longo, 7-15 mm. latis, viridis saturatis, lobi 25-45 mm. longi et 10-16 mm. lati, distantes inter 16-25 mm.; areolae spinibus parvis 3; flores $12 \pm$ cm. longes, 10-15 cm. latae ad anthesim, fragrantissimae, ovarium viridum, tubus et segmenta perianthii exteriores purpureis, segmenta interiores lactei; ovarium 2 cm. longum squamulis 1-2 mm. longis in axillis lanatis, setosis et spinosis; tubus peri-

anthii 3 cm. longus, 1.5 cm. diametri, teretis; perianthii segmenta 6-7 cm. longis, lanceolatis, acutis; stamina filamentis lacteis, 15 mm. longis, antherae 3-4 mm. longis; stylus 6.5-7 cm. longus, lacteus, 6 mm. diametro, in tubo contractus abrupte ad 4 mm., stigmatibus 12-14 lanceolatis, 16-18 mm. longis; fructus ignotus.

***Cryptocereus Anthonyanus* Alexander n. sp.**

Branches in clusters at intervals along the climbing stem, to a meter or more in length, 7-15 cm. wide, bright green, the lobes 25-45 mm. long and 10-16 mm. wide, somewhat tapered toward the rounded apex; areoles small, bearing three short spines; flowers $12 \pm$ cm. long, 10-15 cm. wide at full expansion,* ovary green, tube and outer perianth segments madder purple, five intermediate segments cream with the lower margins madder purple, the innermost four segments cream-colored; ovary about 2 cm. long, scales 1-2 mm. long, their axils

*Very fragrant.



FIG. 68. Jesus Maza, native son of Chiapas, holding the looped stem of a 20-foot plant of *Cryptocereus Anthonyannus* n. sp. At each hand is a cluster of branches.

bearing dirty gray felt, gray-brown bristles and stout pale brown spines 1-3 mm. long; perianth tube 3 cm. long, 1-5 cm. diameter, terete, its

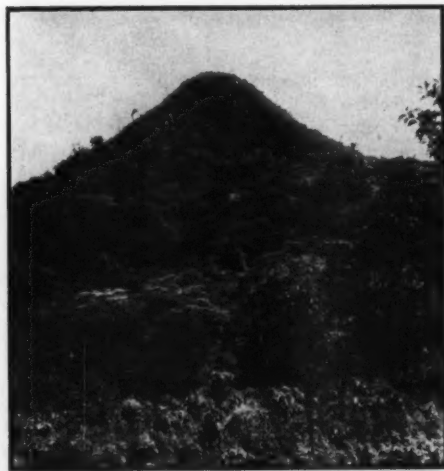


FIG. 69. Pico Carrizal, type locality of *Cryptocereus Anthonyannus* sp. nov. In this hill Dr. Matthew Stirling discovered a cave with enough antique pottery to "furnish a museum."

scales 3-6 mm. long, ovate-lanceolate, the lowermost with wool and bristles, the upper naked; the uppermost 8-10 mm. long; perianth segments 6 cm. long, some outer ones similar to the scales of the tube and 1-2 cm. long, all lanceolate and acute, the outer ones recurved-spreading, the inner erect-spreading; stamens with cream-colored filaments 15 mm. long, style cream-colored 6.5-7 cm. long, 6 mm. in diameter above the throat, in the throat it is abruptly contracted to 4 mm. in diameter in the tube, stigmas 12-14, lanceolate, 16-18 mm. long.

Type collected by T. MacDougall on the Pico Carrizal, about 12 miles north of Ocozacoautla, near the trail to Quechula, State of Chiapas, Mexico, in February, 1946, and flowered in the greenhouse of H. E. Anthony, Englewood, N. J., in June, 1950. Specimen deposited in the Herbarium of the New York Botanical Garden.

The relationship of *Cryptocereus* is rather obscure, but the type of flower is clearly Hylocereoid and so it is placed in the Hylocereanae, where its flattened phylloid stems place it next to *Sirophocactus*. It differs from that genus in

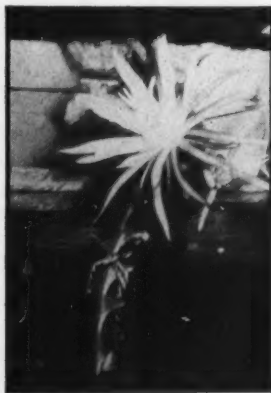


FIG. 67. *Cryptocereus Anthonyannus* n. sp. showing a fully expanded flower.

the lobed stems with the areoles bearing three short stout spines, and in the short stout, non-tapering perianth-tube and the presence in the axils of the scales of the ovary of wool, bristles and spines. The flower is more nearly like that of *Mediocactus* or *Acanthocereus*, but the non-differentiation of the inner and outer perianth parts and the tube shorter than the perianth limb, together with the flattened stems, point away from those genera. Comparison with the drawings in the illustrated key in Marshall and Bock's "Cactaceae" makes these differences quite apparent.

ADD COLOUR TO SUCCULENT COLLECTIONS

By P. D. BRUCE

From The Journal of the Cactus and Succulent Society of New Zealand

So many small collections of the other succulents I have seen have been very noticeably green—healthy probably, and many in their natural colour, but when there are so many really colourful ones it seems a pity not to know them and include some in such a collection. First, I would suggest *Graptopetalum paraguayense*, which is an amethyst colour, thick fleshy leaved, forming a rosette. Hardy and attractive, it retains its colour better when kept in a sunny position. In fact that is the requirement of all these colourful succulents, with perhaps the exception of *Sedum lineare variegatum*, a narrow-leaved plant with a mid-stripe of cream on the small leaves. It is effective as a pot or hanging plant, but tends to turn away from the sun. A further variegated *Sedum* could well be included here, *S. sieboldii medio-pictum*—small round leaves, fleshier than those of *S. lineare variegatum*, but smaller in growth, in that it is suitable for a pot or basket. A most inviting plant, especially when it produces its masses of pink star-like flowers.

Sedum stablii, when grown in poor soil, full sun, and given very little water, will become a mass of brilliant brick-red "beads"—quite attractive in flower, too, with its contrast of yellow "stars." *Kalanchoe (Bryophyllum) foedtschenkoi*, purple leaved in winter—*Sedum adolphii* and *S. nussbaumeri*, two butter-yellow plants with fairly thick leaves. These plants form woody stems and branch out to make neat little bushes, but are excellent pot plants and need very little re-potting. *Kalanchoe tomentosa*, the Panda Plant, with the poker-work dots round the edges of its furry leaves, is a grand favourite and definitely a "must have." Its growth is similar to the previously mentioned plants. *Crasula spurium*, a trailer with small heart-shaped leaves and tiny pink starry flowers in winter, not so well known as a pot plant, but often grown in frost-free gardens. Potted and kept dry in winter, this plant turns really scarlet.

The dark red leaves of *Kalanchoe kewensis* and *K. welwitchii* make a fine contrast to some of the yellow-leaved varieties of *Sedum* and to the almost glaucous colour of a well-grown *S. treleasei*. This plant seems to become drawn very easily and loses its blue shading. Closely-related is *Sedum pachyphyllum*, which achieves an attractive dash of red at the tip of each cylindrical inch-long leaf when it is in the sun. *Pachyphytum oviferum*, perhaps the most perfect, when not blemished, of these colourful succulents, has oval to round leaves covered in bloom, which gives them a pale mauvish-grey colour. There are several species of *Pachyphytum*, but *P. oviferum* is the most beautiful, with *P. glutinosum* and *P. bracteosum* following closely.

Echeveria kewensis, with its outline of red round bluish leaves, is certainly not without attraction, and the furriest of *E. leucotricha*, with its own dash of poker-work in competition with *Kalanchoe tomentosa*, followed closely by two other furry ones, *E. pilosa* and *E. pulvinata* (with its brilliant red tips). And a further contrasting *Echeveria*—*E. metallica*, with its large leaves of mauve to purple, which is rather breathtaking. Even the ordinary *Bryophyllum* is colourful in leaf when it is not shaded or given rich soil. The purple spots and shadings on the leaves predominate.

Dudleya candida is perfectly white—that is, when the meal or farina on this narrow-leaved *Echeveria* type of rosette is not marred. *Cotyledon orbiculata*

(white-leaved variety) and the rarer *C. undulata* are both further white-leaved specimens, the former being comparatively hardy, but the latter is definitely an indoor plant, and not quite so easy of cultivation as the others.

This list could go on much further, but these few plants mentioned will indicate how colourful even a small collection of succulents can be without considering flowers, the main points of cultivation being as follows: full sun, porous soil, dry conditions. These rules of cultivation apply when the plant is more or less of a mature or pot size. When you are starting with a cutting or small root, richer soil, though still porous, and more moisture are needed to make the cutting or seedling into a full-sized plant. But care must be taken always to prevent the plant from becoming drawn or spindly; this usually results from too little light and sun. A drawn plant is never attractive, however much it has grown.

WHAT TO SEE AT DENVER

(Convention—July 10-12, 1951)

That's a subject I have often considered but found it hard to start writing about. The reason is there are so many things to see. Also a majority of the Denver folks must have spent considerable time deep in the heart of Texas. According to them, everything mentioned is the biggest, the highest or the best there is. Well, I don't blame them for they have a lot of mighty fine things to see. Beginning right in the heart of the city, just to the south of the business district, is a very fine civic center facing the state capital building on the other side of a park. This section is just a mile high as Denver is the highest large city in our country.

From the capital dome there is a fine view over the rolling plains into Kansas. To the west the view includes range after range of mountains with peaks rising up to over fourteen thousand feet. Few of us realize that though Denver is not in the mountains, it is at the very foot of the greatest mountain chain in the country.

In the city are famous museums including the State Historical, Denver Art, Denver Natural History and several minor ones. Then there's the United States Mint if you wish to see how and where those elusive silver dollars are made. The many city parks offer numerous attractions and Denver's chain of mountain parks provides many more. The nearest mountain park which overlooks Golden, contains the last resting place of Buffalo Bill, a museum pertaining to his life and a wild game preserve featuring a herd of buffalo. Just below this park is Red Rocks where the city of Denver has built a very large open air theatre on the slope between formations of fantastic and gigantic red rocks. In the shadow of one of these rocks is the pueblo building where we will hold our fun session with its initiation into the Ancient Order of Cactus Nuts and tickle our palates with a buffalo feast.

A little farther out, yet so close the round trip can be made in a half day, is Mount Evans. At the summit in this park, the highest automobile road on our continent, reaches 14,260 feet above sea level.

A two hour drive to the north and west will bring the sight-seer into the Rocky Mountain National Park where lakes, rivers, glaciers and high mountains abound. The route from the east via Longmont traverses the Trail Ridge Road to over twelve thousand feet, then goes down on the west to return to Denver via Granby and Idaho Springs.

Less than two hours to the south of Denver is famed Colorado Springs lying in the shadow of rugged Pike's Peak.

HOWARD E. GATES, Chairman

To be continued

NEW YORK MEMBERS

Will all Society members interested in forming a cactus club within the five boroughs of New York City please communicate with Arthur R. Herrmann, 3110 Kingsbridge Terrace, Bronx, N. Y.

CACTI IN WASHINGTON

Mr. R. B. Sandstedt, of 1006 E. 40 Street, Seattle, Washington, would like to see an article on the cacti of that state. Perhaps someone has collected cacti in that state and can send some notes for the JOURNAL.



FIG. 70. *Sedum multiceps* as a pot plant.

SEDUM MULTICEPS Coss. & Dur.

By J. R. BROWN

This is a very well known Sedum, both in Europe and the United States, but probably better known because of its interesting growth habit than as a flowering plant.

It is one of the plants raised in countless thousands in this country for use in the so-called Cactus Bowls. Young plants of this Sedum with the densely aggregated leaves in terminal rosettes, the branching habit and the withered leaves on the stems greatly resemble in appearance the Joshua Trees (*Yucca brevifolia* Engelm.) of our Mohave Desert and for this reason are called miniature Joshua Trees. Others see a

resemblance to Pine Trees in their branching.

While this is known as a shy flowering plant in cooler climes, here in So. California it is very floriferous; being a native of Algeria it probably likes a good deal of sunshine to flower freely. The flowers are bright yellow and very conspicuous, being about $\frac{1}{2}$ inch across. It flowers here for about 6 weeks, through June into July, when bright yellow flowers are somewhat scarce in the succulent garden.

Very easy to grow in any average garden soil; it also makes an interesting and attractive pot plant, having a neat and distinct appearance.

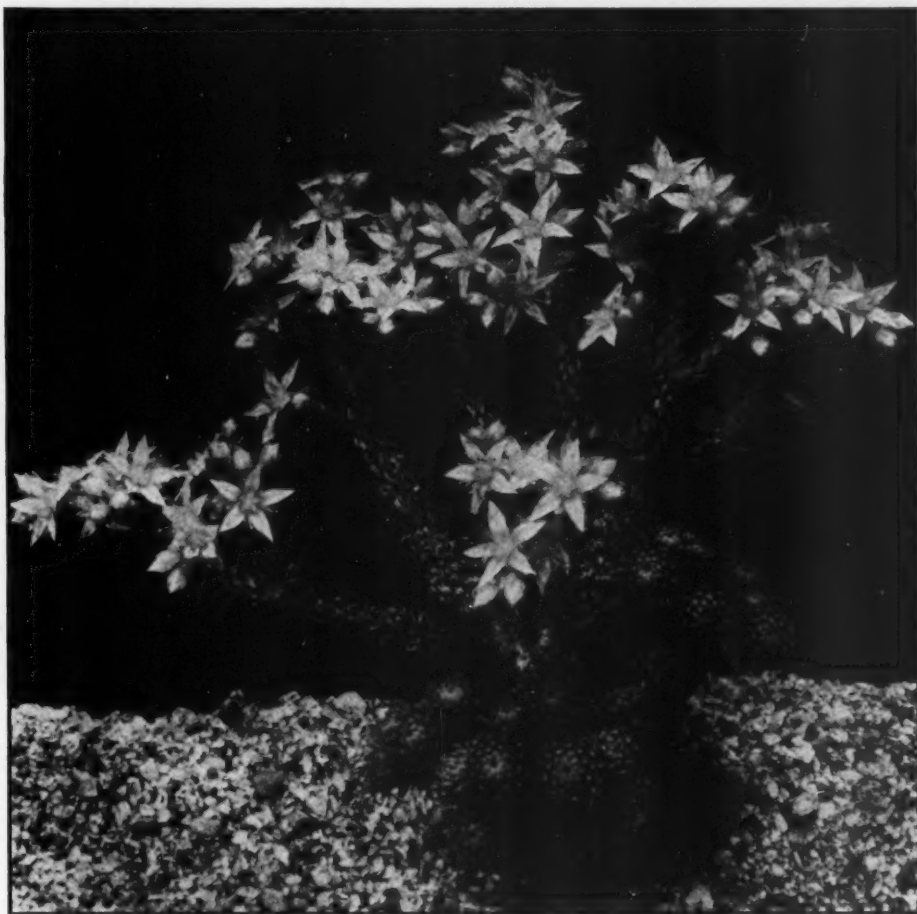


FIG. 71. *Sedum multiceps* nat. size.

ROUND ROBIN NEWS

The response to the idea of conducting round robins in connection with the JOURNAL was enthusiastic. As a result, Round Robin No. 1 is now on its initial flight with seven members. I hope to have some information on its progress to give you in a future issue but, meantime, you may be interested in knowing who is in this robin besides myself. Here they are:

Mrs. S. J. Panis
Box 705, Falmouth, Massachusetts.
Miss Marian Fox
R.F.D., Watertown, New York.
Mrs. H. E. Anderson
126 N. Fourth Avenue, Royersford, Pennsylvania.
Miss Ella Nipper
Chester, Illinois.
Miss Marie Podgajsek
Box 57, Ogema, Minnesota.
Mrs. Howard Karr
R.F.D., Otley, Iowa.
Several different States are represented so we should

have some interesting information on how they grow cacti in their various localities.

Round Robin No. 2 will get underway soon. We need more members for it. If anyone is interested in joining this group, please write to me. A director is also needed. Would someone like to volunteer?

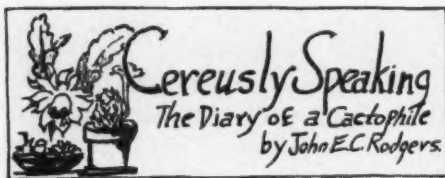
The thought has come to me that perhaps some of you would enjoy a Round Robin on a specialized groups of plants—such as the Mammillarias, Euphorbias, or the Echeverias. If so, I should be happy to hear from you.

This Round Robin idea does not necessarily need to be confined to amateur groups. Here is a chance for all members of the Society, whether beginners or advanced, to contact other members and to discuss their plants and compare notes. We could have a Round Robin for the advanced collectors.

Until next time, Good Flying—

MABEL H. FAY
123 North Avenue
North Abington, Mass.

(See next Journal for full report)



Although most collectors have discarded Opuntias for various reasons—such as space, winter storage and "over-active growth centers," I am going to speak in their behalf. To become sentimental—I picked the first spines of any cacti from my "blue serge" which was made untenable by Opuntia spines and spicules. Most Opuntias are too large for the crowded quarters we Easterners have to cramp into during the "cooler" parts of the year. But my list doesn't include these. I shall discuss these latter Opuntias though my first love was larger, more vigorous and penetrating.

Not less than 60% of all the cacti sold in our dime stores, gift shops and florists shops belong to the Opuntia. These are *O. microdasys* (three shades of spicules), *O. subulata*, *O. vestita*, *O. mammillata*, *O. vilis*, *O. cylindrica* and various spineless ones. *O. elata*, "Burbank's Spineless," and "Mission Cactus" pads. It is evident that the public does not share the collectors disdain for the "teething ring" of most collectors past and present.

My favorites in the Opuntia clan at present are: *Tephrocactus sphaericus* (from Peru), *O. Moelleri* (South America), *O. Verschaffeltii* (from Bolivia), *O. papyracantha* and its varieties, *O. ovata*, *O. compressa*, *O. retrorsa*, *O. imbricata*, *O. (Consolia) rubescens*, *O. brasiliensis*, *O. mamillata*, *O. serpentina cristata*, *O. Santa Rita*, *O. basilaris*, *O. polyacantha* and *O. fragilis* besides the ones I listed above.

The local names I've heard usually indicate shape more than coloring. The three shades of spicules of the *O. microdasys* attract the most buyers. They're called "Bunny ears." *O. vilis* and *O. imbricata* are called "Tree Cactus" although I've seen *O. imbricata* up to 5 feet. *O. vilis* never exceeds 6 to 8 inches. Johnson's Cactus catalogue lists *O. vilis* as "Dwarf Tree Cactus." *O. vestita* is the "Old Man Opuntia" and "Whiskers." It bears "hairs" on the stem and new growth which I've heard does not disappear with age. Most collectors agree it is none too reliable in the collection and must be replaced quite frequently. *Tephrocactus sphaericus* is called "Little Pickles" and "Thimble Tuna." *A. ires* and *O. cylindrica* both get the nickname "Devil's Cane" while *O. cylindrica* is also called "Devil's Club." *O. Mammillata cristata* has become "Boxing Glove," "Brain Cactus" and "Giant's Club." The other crested one I own *O. serpentina* is called "Fan Cactus" and "Cock's Comb." *O. rubescens* is called "Red Cactus."

So far my Opuntias are not kept for their blooms, but a few have surprised me. *O. Brasiliensis* blooms sparingly when it gets 3 feet high but it must be full of stems and slightly pot bound. Flowers are yellow (beaten egg color). It makes a good single living room tub-plant for winter and lawn specimens for the summer. *O. compressa* (*O. opuntia*) both pure yellow and reddish eyed blooming types is hardy here and blooms during June and July, sets fruit and seeds itself. *O. elata* blooms in summer with an orange-yellow bloom on almost spineless dark green glossy "oval" stems. *O. rhodantha* and *O. fragilis* were sent to me from North Dakota already budded; both opened in late June. *O. fragilis* was yellow and *O. rhodantha* "pinkish red." I store these last two on the back porch in flats of sandy soil to protect them

from our wet winters.

Diseases of all Opuntias are caused by too much water, nematodes, scale, spine bugs, mealy bugs and lack of minerals. My personal opinion is that these are all results of poor nutrition rather than true diseases. There is not much you can do with Opuntia rot only cut out the decayed portion, dust with sulphur and watch to see no new outbreak takes place. Lack of some of the rare minerals such as Potassium, iron, manganese, copper, and calcium cause disturbances such as "yellows," weak spines, drying back and loss of roots. Soakings with strong "Naphtha Soap" suds, "Black-Leaf 40," etc., help to control most root pests. Clean soils control nematodes. Oil sprays help to control scale, but it is impossible to completely eradicate scale which has been, no doubt, one of the reasons for the decline in popularity of the Opuntia.

The Opuntia grows from southern Canada to Terra del Fuego both on the mountain sides and the plains. It is not a forest dweller so it really is a sun-shipper. Their heavy waxy coverings, spines, spicules and long root system shows that they grow where the soil is not only dry but rocky where the sun beats down with merciless abandon.

Soils need to be loose with plenty of sand, lime, leaf mold and good drainage materials in it. They grow luxuriantly so they should be pruned frequently to fit into their "place in the sun." Most of the plants I have mentioned if not expected to flower are interesting in the window garden, desert bowl and dry terrarium. I really envy the person who specializes in Opuntias as window garden subjects without any other idea in mind than as "foliage plants." They offer variety of shapes, color, spine, decorative possibilities and charm.

Those that I've had flower as well as I've seen flower have attractive flowers which have a beauty of their own. The colors are usually clear yellow through orange-yellow and pink through red with various oddities in browns, and greens.

My plant of the month is *Opuntia compressa* (*O. opuntia* Br. & R.) because it has a counterpart in all but a very few states in the union. It is found under various names (21 listed in Br. & R. Vol. I, pg. 127) throughout U. S. A. and Canada also found naturalized in Switzerland and Northern Italy (Br. & R. Vol. I, page 127). The variety I like best is the yellow, silk-like flowered one. It has a wrinkled skin (in my garden) the year around. The yellowish 1½ inch spines which border the stems add to its decorative possibilities. My plants grow covered with grass and weeds even partly covered with ant hills yet they bloom, set seed, and grow from seed even when the sandy bed is completely surrounded by water from spring rains for weeks at a time. Yes, it is fool proof. It asks to be let alone to make its own environment.

It refuses to die when uprooted. It sends out roots from every "eye" of spicules where it touches the ground. It shrinks when the weather is freezing and condenses its juices until they are too concentrated to freeze. Its blooms are yellow or yellow with maroonish centers followed by green fruits which shrink as they turn reddish purple in the fall sunshine. It prefers plenty of lime rubble in the soil but it grows most anywhere it gets a foothold except in too much shade. Many of its strange names (synonymy) are because of its variety of stem forms. Although I've never seen any birds eat the fruit I've found they are relished by field mice. It is not maudlin sentiment I'm giving you, because I keep all the Opuntias I can store from the largest pads to the smallest from South America. My case is closed I'll let you be the judge but I'm for Opuntias.



FIG. 72. Habitat photo of *Haworthia glauca* growing in the crevice of a rock on the Zuurberg

COLLECTING SUCCULENTS IN SOUTH AFRICA

By F. R. LONG

PART V. On the Zuurberg

In my article No. 1, we turned back after reaching the drift on the river. In this present trip I shall describe operations from the river up to the top of the Zuurberg (Sour Mountain), some 2,200 feet above sea level.

The Sundays river valley hereabouts has been cleared of bush to make room for flourishing citrus farms where high-grade "Washington Navels" and grapefruit are produced. The soil is a deep alluvial loam and very rich. It is irrigated by water conserved at Lake Mentz, an artificial dam on the Sundays river on the north side of the range of the Zuurberg. As soon as the farms are passed on the upper side of the canal at Liendlovu (Elephant) railway siding we ran at once between high dense bush, the typical Addo Bush.

Here several species of Euphorbias were located. *E. Ledienii* Berger is plentiful, growing in full sun, *E. clava* Jacq. and *E. fimbriata* Scop. at the edge of bush, *E. meloformis* Ait. on the flat in full sun amid grass and *E. gorgonis* Berger in more exposed positions, *E. globosa* Sims not so fussy as to its habits, *E. mauritanica* L. everywhere in the open glades, and *E. caterviflora* N. E. Br.

One of the first flowers to catch the eye is

that lovely Tecoma creeper, the "Cape Honey-suckle" (*Tecomaria capensis*) a plant largely used as a flowering hedge. Another red flowering creeper sprawling over the bush here is *Aloe ciliaris* Haw. and a few hardwood cuttings were put in the collecting sack as it can always be usefully employed in the garden. A smaller form and less scandent, *A. ciliaris* var. *Tidmarshii* Schl., is found further on on the Zuurberg Pass, another useful plant always showing a few flowers. This makes up a useful pair with *A. tenuior* Haw. with its yellow flowers found towards the Grahamstown district.

Cheek by jowl with the Tecomaria and *Aloe ciliaris* is yet another famous creeper, this time the wild "Ivy Leaf Geranium" *Pelargonium peltatum* Ait., the parent of all our "Ivies." Cascades of pinkish, mauve to almost white flowers are in evidence on all sides, down banks and over bushes often 12 feet high.

Two other Pelargoniums (Geraniums) famous in horticultural breeding circles are found here, *P. inquinans* Ait., the scarlet "zonal" with a white eye, growing in the dry bush and *P. zonale* Willd. which prefers the damper kloofs in the hills—both famous parents of our well known bedding and greenhouse "Geraniums."



FIG. 73. *Haworthia glauca*. Exceptional large growth 10 inches in length.

The succulent *P. tetragonum* L'Her. was also collected in dry soil and without leaves with its conspicuous four-sided stems. This makes a useful addition to the succulent collection. The leaves appear after rain. Still another Pelargonium found was *P. carnosum* Ait.

We were soon steadily climbing through heavily wooded country by now, almost forest. Here on the damp rocks we found the pretty *Crassula rosularis* Haw. with its rosette of leaves lying flat against the rock face, also a stray orchid, *Holothryx* species, and two species of *Streptocarpus*, *S. Rexii* Lindl. and *S. parviflora* Drege, making the damp slopes gay with their mauve flowers in contrast to the white flowers on pink stems of the *Crassula*, all in shade.

Looking down to the plain that we had left almost 2,000 feet below, we saw miles of Addo Bush with the Sundays river snaking through the valley. By tracing the railway line and the siding at Llendlovu to the station at Addo, we were able to locate the National Parks Board Elephant Reserve. With the exception of 4 to 5 animals in the Knysna Forest to the west, the last of the once vast herds of elephants that formerly were to be found in the Cape Province in Thunberg's period, 1772-75, are preserved in this area of 16,960 acres, just below where we were standing. Here there are some 17 of these animals still in the wild. A few years ago there were 27 and in 1920 more than 80 head! What a tragedy to think that this last remnant of the species should be in danger of early extinction.

The elephants largely feed on the leaves of "Spekboom," *Portulacaria afra* Jacq., and so do cattle. It is said that the latter can forego water during the frequent droughts experienced in this locality so long as they can feed on the succulent leaves of this Portulacaceous plant. In

fact cattle grow fat under these conditions. The elephants can usually be seen by arrangement with the Park Ranger (Coerncy Entrance). Other animals preserved in the Park are Bushbok and Buffalo, all 40 miles from Port Elizabeth and easily negotiated by visitors from overseas.

After this divergence from flora to fauna let us get back to our journey. In the more open foothills a few Stapeliads were located. *Duvalia radiata* Haw. was one of the smaller plants found here with its lovely starlike flowers. *Huernia scabra* N. E. Br. and *Stapelia grandiflora* Mass. were two others.

The steep narrow kloofs are the home of some fine specimens of the tree *Euphorbia*, *Euphorbia grandidens* Harv. 30 feet high, also a fine group of *Encephalartos longifolius* Lehm. (not *E. caffer* Mig. as it was formerly known) with its graceful, dark, glossy, palm-like leaves. Seedlings and small offsets from the base of the main trunk should be grown alongside succulents. They are very tough and stand roughing it.

Reaching the top of the berg, 2200 feet, and passing the Zuurberg Hotel we ran into more open country and here found a lovely acaulescent Aloe, *A. pratensis* Bak. growing among the grass. This Aloe is never found in anything



FIG. 74. *Aloe pratensis*. Photo by G. W. Reynolds.

but in ones or twos. It should find a place in every collection. Round about were wild *Nemesias*, and *Diascias*. Under the shade of an *Acacia* I came across an outsize growth of *Ha-worthia glauca* Bak. It was enormous and I could only surmise that it had been thriving on the cattle manure evident near at hand. We later found a hillock with plenty of normal *H. glauca* Bak. growing in full sun, on well drained slopes and just very ordinary soil. This species seems to be rare as this is the only locality I have ever come across it. It seems to be an easy grower.

Euphorbia clava Jacq. was plentiful in the scrub and occasionally in the grass. Another *Euphorbia* but less interesting was *E. Helioscopia* L.

A plant that must not be overlooked is *Oldenburgia arbuscula* D.C., a giant tree Composite. Certainly it is not a succulent but it stands out on these hills, having defied years of storm, fire and grazing. The large leaves are reminiscent of the long leaved *Rhododendrons* with dark green surfaces and with white tomentum on the under side, the flowers resemble a huge Scotch thistle.

I must still transgress from my subject of succulents to mention *Dierama pendula* Bak., that lovely "Mountain Hair Bell" found on the Berg, also many species of *Erica*. One tree of *Erica arborea* Thunb. must have been 15 feet high with a mass of white flowers. Other non-succulents seen were species of *Gladiolus*, *Anapalina* (*Antholyza*), *Freessias*, *Moraea* or "Tulip," *Tritonias*, *Watsonias*, *Kniphofia aloides* Moench, *Agapanthus umbellatus* L'Her. *Scillas* and *Disas*.

It is a fascinating piece of country to the keen collector. On my first visit to the Zuurberg, F. J. Cook, now superintendent of parks, Port Elizabeth, and I went off on our annual leave by car, spending the first night at the Zuurberg Hotel. The following morning we started off at 9 A.M. making for a spot near Somerset East, about 130 miles away, where we had a lunch date. We were so engrossed in collecting plants we had never seen in the wild before that time for us did not exist. We were busy digging out bulbs of *Dierama pendula* Bak. when I happened to look at my watch, then I looked at my speedometer, the first said 12, noon, the second stated we had done 41½ miles in 3 hours! That lunch seemed a long way off but our collecting bags were full. What a thrill for the naturalist to be in a district such as this one for the first time and to see well known garden plants growing wild in their own habitat, the parents of so many varieties



FIG. 75. *Euphorbia triangularis* near Gamtoos River.

to be found listed in the nurserymen's catalogues.

Before closing this account two outstanding plants found on the Berg must be mentioned in spite of them not being succulents. One is *Plumbago capensis* Thunb. with its beautiful pale blue flowers, a shrub that makes such an attractive hedge in localities almost frost free. The other is *Gardenia Thunbergia* Linn. with its strongly scented white flowers with a long tube and with its seed pods that hang on to the tree for several years, standing out so conspicuously the size of a small mango. Seedlings of this *Gardenia* make an excellent stock on which to graft the double white form of *G. florida*. The resulting plant will stand much rougher and drier treatment. This method has been in vogue for many years in the Port Elizabeth parks.

A run of 55 miles from the Hotel to our headquarters in Port Elizabeth on an excellent main road brought our trip to a successful end.

* * *

Previous installments appeared as follows:

Part I, Vol. XIX, No. 9, pg. 135

Part II, Vol. XX, No. 6, pg. 87

Part III, Vol. XXI, No. 3, pg. 69

Part IV, Vol. XXII, No. 3, pg. 69

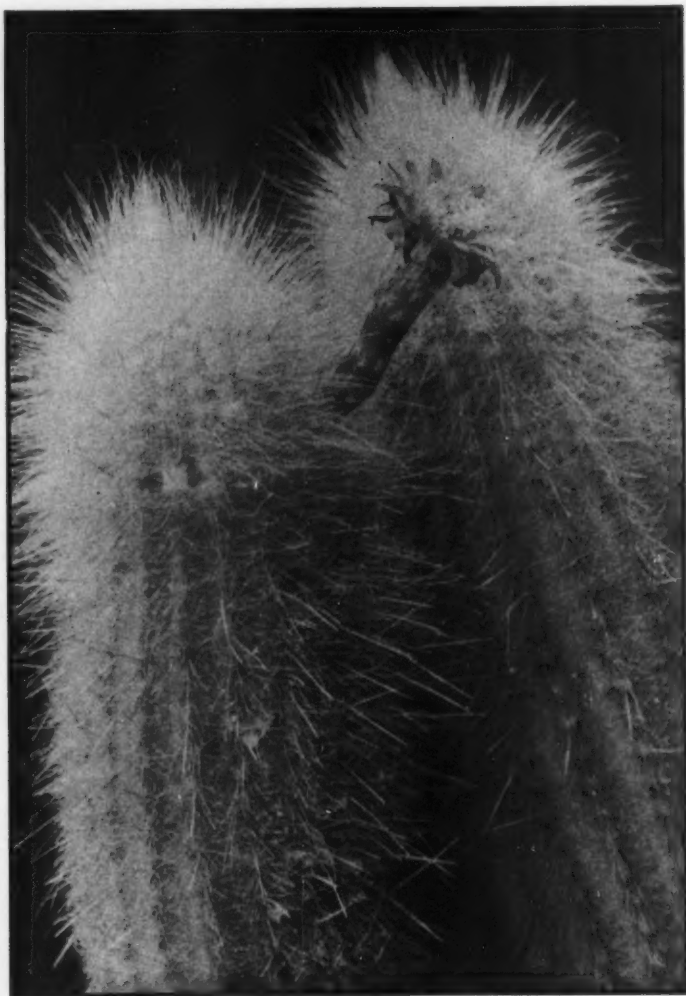


FIG. 76. *Peruvocereus multangularis* (Willd.) (Br. & R.) Akers.

FROM PERU—PERUVOCEREUS MULTANGULARIS

By JOHN AKERS

Cactus multangularis Willd. 1813

Cereus multangularis Haw. 1819

Echinocereus multangularis Rump. & Forst. 1885

Binghamia melanosteale Br. & R. 1921

Binghamia multangularis Br. & R. 1924

Haageocereus pseudomelanosteale Bckbg. 1931

Plants columnar branching from the base to form groups of from ten to fifteen stems, branches up to one meter high and from 6½ to 7 cm. in diameter; stems somewhat clavate with a sage green, papillose epidermis that is hardly visible; about 17 to 18 low ribs with

approximate (9 mm. distant), nearly circular areoles (4 mm. long by 4 mm. wide by 2 mm. high); spine cushions filled with short, white, kinky hairs and hardly conspicuous; about 23 pale yellow, mottled-brown, hardly pungent, acicular, one cm. long spines emanate from each areole; central spines one or two, slightly depressed, slightly pungent, flexible, acicular, 2.5 to 4.5 cm. long and shaded yellow tipped with brown; about 25 whitish, silky, 2 to 4 cm. long bristles emanate from the lower half of the areole; flowers diurnal, solitary, from near the apex

of the stems; flowers narrowly funnel form with a rotate limb about 4.5 to 5.0 cm. across; inner perianth segments lanceolate-spatulate, apiculate, deep rose magenta to rhodamine purple; outer segments narrowly lanceolate, chocolate shaded purple and much reflexed; stamens many, included; filaments rose purple above, lighter below; anthers oblong with buff colored pollen; style slightly exerted, pale pink, fairly heavy; lobes about 15, long and pointed (1 cm. or over) and greenish yellow in color; tube 7 cm. long, orange brown, scaly; scales apiculate tipped greenish yellow and rather distant; about 50, one cm. long, matted white hairs in the axils of the scales; occasionally some short brownish hairs are also present; ovary green, scaly and hairy; fruit ovoid, 4 cm. long, magenta; scales distant (8 mm. apart) small, with minute yellow horns; about 20-30 short (1 to 2 mm. long) white hairs in the axils of the scales; floral remains brown, persistent and covered with whitish hairs; pulp white, insipid; seeds black, small, punctate with a small gray hilum; roots coarse and woody with loose, scaly bark.

Type locality: Cajamarquilla, Peru.

Distribution: In the lower tributary canyons of the Rio Rimac, Peru.

This bristly *cereus* superficially resembles *P. setosus*, but has fewer ribs, many less bristles, different flowers and fruit. The plant is a moderate bloomer and is quite attractive. In general, it appears to be *Binghamia multiangularis* Br. & R., but they state that their plant is a

white-flowered nocturnal type. As Britton and Rose's species has not been re-located at the type locality, it is possible that their original description was in error. Backeberg in *Kaktus ABC* states that the type locality of this plant is Cajamarquilla.

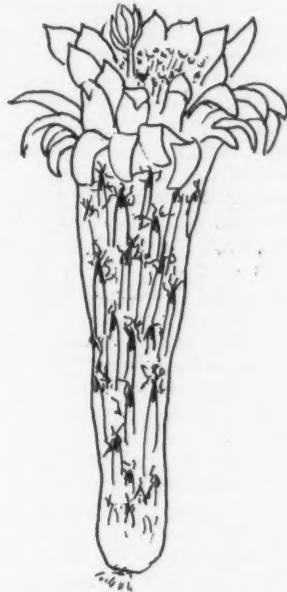


FIG. 77. Flower of *Peruvocereus multiangularis*.

THE CACTOPHILE IN THE CLASSROOM

By JUDITH STERN

It was quite by chance that I became interested in this absorbing hobby—the care of cacti. We were visiting a greenhouse to purchase some shrubs when my attention was attracted by a little plant with a gay yellow blossom. All the salesman could tell me in answer to my questions was that it was a cactus—he did not know its name. (Now I know that it was not a cactus, indeed, but a succulent, *Faucaria tigrina*.) I took it home with me, but my curiosity was tantalized. At the New York Botanical Gardens it was suggested that the Abbey Garden Press would have literature which would help me. Thus were my feet first guided to a world of absorbing fascination for myself and the materials for a richer and more meaningful education for the children under my care. (I am a teacher in a large New York City school.)

At first I kept my hobby more or less to my-

self; but after a time I began to realize, as so many cactophiles do, that pleasure unshared is usually halved. I noticed that when I put my plants outside for their daily sunning the little ones in the neighborhood would gather around to admire them. I began to distribute potted cuttings to the five- and six-year-olds who showed an interest in my display. Then I exhibited in the local library. So great was the interest it aroused that the newspaper ran an article on the exhibit, complete with pictures. My neighbors look forward each summer now to this exhibit which has become a regular institution.

What gives me greater satisfaction than all this, however, is the use I have made of my hobby in teaching. Whether the learning activity is the study of our own country or of the world outside our borders, there can be no more

meaningful starting-off place than making the acquaintance of the exotic flora of the land.

Generally, before our unit of study begins formally, I bring to class several of my more attractive and odd-appearing plants. The children are always interested in them; they handle them, they learn their common names, they often show an eagerness to possess some for their very own. "Why don't these plants grow wild here?" asks one.

Then I explain how the cactus is a type of plant wonderfully developed for life in its peculiar environment. I explain how changes in climate through the slow progress of the centuries gradually evolved the type of flora represented in the plants before them. They listen wide-eyed and enthralled to the story of "long, long ago before history was born." From there the step is a simple one to the formal inauguration of the learning unit. Children are eager to learn, eager to know about the world that lies beyond their door. The questions come rapidly: what is the country like where these plants grow; what are the people like; do the children go to school as we do; do they play games like ours.

Thus, dexterously guided, a problem or a series of problems are propounded by the children themselves and the stage is set for an educationally worthwhile and meaningful adventure; meaningful because it arises out of the needs of the pupils, and worthwhile because of the social learnings involved. Most important, perhaps, is the realization that people all over the world are the same in their needs and desires; the need for foods, for clothing, for shelter, for education, and for recreation.

A unit along this line in which my class is now engaged is one called, "How People Live South of the Border," a study of Mexico. A *Mammillaria heyderi* with its crimson fruit, an appealing *M. decipiens*, a *M. rhodantha* in bloom and a tiny *Cephalocereus senilis* with its hair ridiculously and sedately parted in the middle, all placed on a sunny window ledge furnished the introduction. With what eagerness did they con the catalogues to make up their small orders! One lad would have nothing but the largest size saguaro because he had a passion for the West and for cowboys. How assiduously they practiced their penmanship to have the privilege of writing out the final class order! The catalogue offered 10 per cent in bonus plants. What did that mean: how could they find out what 10 per cent of \$10.70 came to? (Did they realize they were learning arithmetic? I am sure they did not.) What was the proper way to address the envelope? Should the letter be sent air mail? All these and many

more learning experiences came about naturally as a result of those few small cacti sitting on the ledge.

While they were waiting for their plants to arrive they turned to a study of the land where most of the cacti make their homes. A list of questions was compiled. Committees were formed to seek and report upon the answers. We learned about the geography of the country, the history of its people, its government, its schools. We even planned and ate a Mexican meal. We visited the museums to study Aztec and Maya designs. We scanned the papers and the magazines for pictures and articles. I brought to class those two elementary texts, Haselton's "Cacti for the Amateur," and Brown's "Succulents for the Amateur." My own copies of "The Cactus and Succulent Journal" were put to good use, particularly the Dawson articles, "A Naturalist's Diary on the Mexican West Coast."

When the first shipment arrived a series of lectures was given on proper soil, potting techniques and subsequent care of the plants. These children, city bred principally, knew the joy of putting their fingers into the soil and smelling the good clean smell of it and watching living things thrive under their care.

Not the least among the lasting values of such learning experiences is this; that some among my boys and girls will take with them when they leave me a creative and satisfying means of spending their leisure time when they enter the adult world where technological advances now point the way to a greater measure of such leisure.

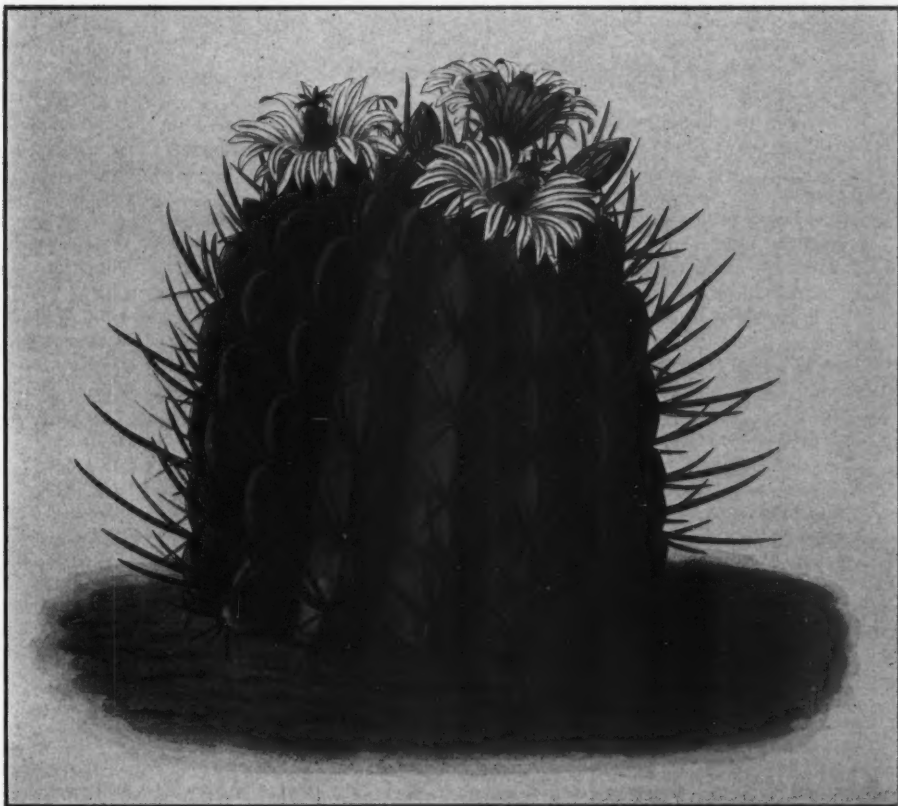
BROMELIAD SOCIETY

Organization of the first international society devoted to the study, culture, and conservation of the Bromeliaceae or family of the Bromeliads (Pineapple family) was effected September 17, 1950, at a meeting of fifty plant enthusiasts and horticulturists in Glendale, California.

The organization will be known as The Bromeliad Society, and annual dues were set at \$3.50. Membership is open to all interested botanists, horticulturists, and amateur flower lovers. The Society plans to publish a bi-monthly journal of material related to its field.

Mulford B. Foster, of Orlando, Florida, well known author, collector, and plant explorer, was elected president of the Society. Other officers were named as follows: first vice president, David Barry, Jr.; second vice president, Dr. R. S. Seibert; secretary, Victoria Padilla; and treasurer, Frank H. Overton.

The Society has been formed to promote the knowledge of this great American family of plants, to encourage research into the group, and to stimulate popular interest in the plants as decorative subjects for both homes and southern gardens. Interested plant lovers are invited to write the secretary, Victoria Padilla, 647 South Saltair Avenue, Los Angeles 49, California, for further information.



Echinocactus coptonogonus Lem.

Plate 28

From Blühende Kakteen—July 31, 1902.

Echinocereus Salm-Dyckianus Scheer

Plate 29

Echinocereus Salm-Dyckianus Scheer in Seemann, Voyage of the Herald, 291; K. Sch., Gesamtbeschreibung, 255.

Cereus Salm-Dyckianus Weber in Bois, Dictionnaire d'horticulture, 279.

Echinocereus Salmianus Hort.

In 1842 the Potts brothers (of whom John, the older, is in charge of the city mint of Chihuahua, while Frederick directs a mine on the Sonoran borders) sent a large number of various native plants to the Kew botanical gardens, and in 1850 they sent a collection of cacti to the gardener then active at Kew, Scheer, who received and inspected them. Of the regions frequented by both brothers, part lie in the immediate environs of Chihuahua, part are still incompletely known to us; but they decidedly lie in states which must be rich in cacti and which in recent times have seldom or not at all been frequented by cactus collectors—for many of those forms previously sent have not since been imported. In some respects this is not too serious a loss as several of the plants have been continually maintained by cuttings in all the larger cactus collections. Yet the wish must again be stated that those regions be re-explored, as we think it impossible that the Potts brothers' single shipment exhausted the wealth of species native there.

We can demonstrate the extraordinary influx of beautifully flowering cacti originating in those days by merely recalling the three Echinocerei for which the successful efforts of these Englishmen are responsible. Truly they are three shining stars: *Echinocereus subinermis* Salm-Dyck, *E. Scheeri* S.-D., and *E. Salm-Dyckianus* Scheer; all three have now appeared in this work. Scheer sent these plants to Prince Salm-Dyck for examination and the latter named one of the most beautiful in his honor, whereupon Scheer in turn established the last-named in memory of the Prince.

While our plate invokes the full beauty of this flowering plant, a large pan of fresh growth covered with a dozen flowers is a spectacular sight. The carrot-colored flowers rise like flames from their fresh-green bed of many intertwining stems. The cultivating of prostrate Echinocerei in flat pans at the Royal Botanic Gardens has proved such an excellent method that each year we now enjoy the greatest abundance of blooms on a large number of species. This gratifying result has another cause as well: the plants are not allowed to become very old, being renewed through cuttings before the height of flowering is past. Not only does the floral display lessen with age but the stems become unsightly as well; the plant loses a considerable portion of its beauty if the stems do not furnish a worthy background for the splendor of the flowers.

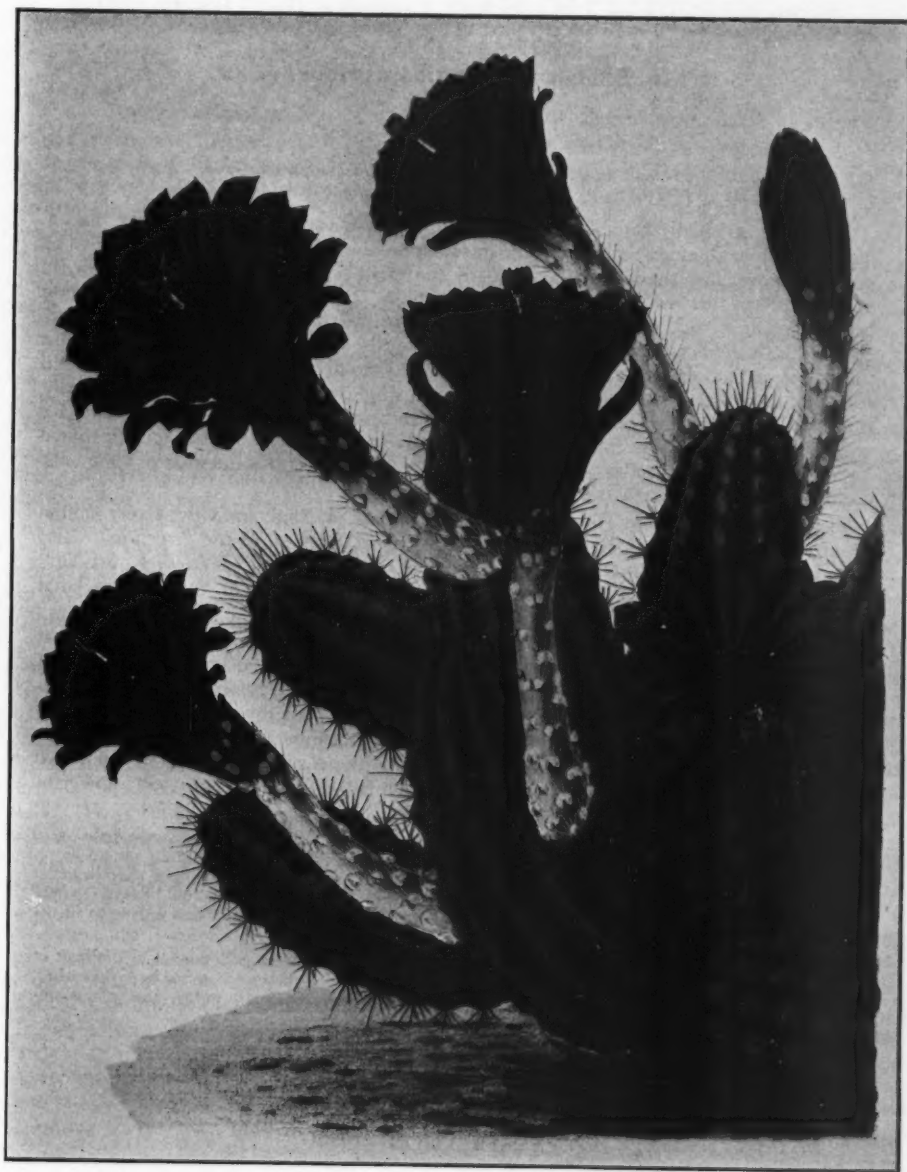
As the plant has been perpetuated through cuttings since the time of its importation and has been widely distributed, it is also at present the best species for propagation. We have occasionally obtained fruit and seed from this plant and though it is little inclined to produce these we have sometimes sought to encourage it by careful pollenization. Hybridizing with *Echinocereus Scheeri* S.-D., which blooms at the same time, has proven a failure whenever tried and yet the close relationship of the two invites a renewal of effort. This would be of some interest as the flower color might prove surprising. I would like to mention that success is not impossible in other localities.

Echinocactus Salmianus still seems to me today the same as *E. Salm-Dyckianus*. One professional gardener has assured me that his flowers were narrower and their color a shade lighter. I have only had plants under this name that when blooming could not be told apart from our species. It seems certain that occasionally in uninformed circles the name becomes accidentally garbed and then, as often happens, it is preserved on a label and falsely distributed in this way.

CLASSIFICATION—1950

Notes by W. TAYLOR MARSHALL

Echinocereus Salm-Dyckianus Scheer.



Echinocereus Salm-Dyckianus Scheer

Plate 29

From Blühende Kakteen—November 14, 1902.

Echinocactus multiflorus Hook.

Plate 30

Echinocereus multiflorus Hook. in Bot. mag., t. 4181; K. Sch., Gesamtbeschreibung, 404.
E. Ourselianus Monv. ex Salm-Dyck, Cact. hort. Dyck., 34 and 169.

Only very gradually has the first mentioned, and only correct, name taken the place it has, and only with effort will it be made to supercede that of *E. Ourselianus*. We have no doubt whatever that the latter was originally conferred on that same plant in the garden of Cels in Paris that was first described and figured by the elder Hooker; however, it must make way for *E. multiflorus*, as it was not only named later but also never described. Perhaps such deliberations may seem immaterial, petty and pedantic; yet to the botanist this is not so, for despite various conflicting and overwhelming difficulties they are still committed to name each living object with only a single, unequivocal name. Fortunately, since the widespread distribution of the "Gesamtbeschreibung der Kakteen" we have progressed considerably in this matter; soon the major projects of cactology will be united under a scientifically exact system of nomenclature, and it is only a question of time until the now conflicting factions also acquire our viewpoint.

Echinocactus multiflorus Hook. forms, with *E. denudatus* Link and Otto, a very natural group within the subgenus *Hybocactus*, which is native to Paraguay and Argentina. Also included with these are *E. Queblii* Hge. jun., *E. Saglionis* Cels, *E. de Laetii* K. Sch. and *E. megalotbelos* Sencke. I should mention here that Dr. Weber of Paris has declared *E. de Laetii* identical with *E. Schickendantzii*.

The close relationship of *E. multiflorus* Hook. with *E. denudatus* would imply that both hybridize easily. Such a case is *E. intermedius* which has been known in collections for many years. Of late it has been shown that *E. denudatus* exhibits a decided, and almost miraculous, ability for variation, displaying this in numerous forms hardly or not at all to be distinguished apart, and so making it the more difficult to define limits for our *E. multiflorus* Hook. But, of course, from among these gad-about between the two species, we can always pick out the original, beautiful and robust form with powerful spines that our plate so admirably reproduces.

A very noteworthy characteristic of the group is the pretty white, sometimes rosy-red-tinged, flowers with their nearly porcelain-like, shining petals; these indicate a transition to a second group of *Hybocactus*, with the type of *E. gibbosus*, which is well separated through other characteristics from the first group. This indication implies that after further investigation we could easily separate the large subgenus into additional groups of smaller content, an important and necessary step in the further development of the system.

The fruit of *E. multiflorus* shows a rare individuality. On the whole it is fleshier than the fruit of many other species of *Echinocactus* and shows a decided tendency to become a softer berry-like fruit. Quite remarkable is its manner of ripening. It softens and becomes almost pulpy, and in this unusual way allows the seed to escape.

CLASSIFICATION—1950

Notes by W. TAYLOR MARSHALL

Gymnocalycium multiflorum (Hook.) Br. & R.

SOME RESULTS OF TWENTY YEARS OF CACTUS RESEARCH¹

By CURT BACKEBERG

PART I. *A Synopsis of the Genera of the Cactaceae**Introduction*

The fundamental concepts which have led to my development of the systematic arrangement herein presented are the following:

All phylogenetic conceptions regarding the *Cactaceae* have heretofore been purely theoretical, for none is based on fossil evidence. In the almost total absence of a fossil record, we know nothing yet with certainty of the age of the family or of its various constituent groups. We do not know, for instance, to what extent the existing forms of the *Cactaceae* represent old "conservative genera," neither which genera represent more or less young stages of a progressive evolution, nor whether they have resulted from vertical evolution or by horizontal splitting up of former factors.

The only facts we know with certainty are these: There must have been for a long time a bipolar evolution, mostly of highly succulent forms, separated by the tropical zone. This is well demonstrated, for example, by the parallelism of the northern and the southern representatives of the cylindrical and globular *Opuntioideae*. It is even more strikingly shown by the two large, separate areas of evolution of the *Cereoideae*, in the north and in the south, in which the parallelism of their respective large groups of globular cacti is particularly clearly evident. These parallelisms are represented in the synopsis below as, for example, "Semi-tribus *Boreocereae*" versus "Semi-tribus *Austrocereae*."

We know, furthermore, that the flower is a modified, short-lived shoot-structure. Accordingly, in the *Cactaceae*, the flower (particularly the ovary and tube) shows a reduction-line of shoot characteristics with all conceivable degrees of reduction from spiny, bristly or hairy flowers to purely scaly or completely naked ones. It is now recognized that within a given group each genus can be ranged as a stage along such a reduction-line representing and reflecting a certain set of factors. If, thus, we cease to classify according to the old collective genera, by which arbitrary groupings we have hitherto overlooked many important differentiating characters, we logically arrive at a system of classification consistent, among other things, with the reduction-steps of the shoot character of the flower. This has been a fundamental consideration in my

separation of genera and in the arrangement of the following synopsis. In addition, of course, I have given proper attention to special characteristics such as zygomorphic and otherwise modified flowers, divergent forms of the plant body, and the various cephalium forms. In doing so other significant reduction-lines through wide ranges of grades have also been recognized.

The various categories in the synopsis are used with the aim of representing natural groups. The erection of the considerable number of categories above the level of genus has been necessitated by the requirements of consistency and is justified by the success with which they unite groups with characteristics in common. The category called "Natio" represents the Latin equivalent of Berger's "Sippen" and is to be regarded as serving to bring together a group of closely related genera.

In the detailed, long-term examination of the entire cactus family leading to this synopsis, a great deal of attention has been given to flower-ing characteristics. As more and more reliable differentiating characters were recognized and naturally related groups identified, the more it became evident that there are very few otherwise uniform genera in which both diurnal and nocturnal flowering species are mixed (*Phyllocactus* and *Echinocereus*²). Thus, as a general rule, it appears that diurnal flowering and nocturnal flowering species respectively show additional differentiating characters which permit them to be placed in distinct genera. As will presently be shown, it became further evident that many *natio*s have distinct diurnal and nocturnal branches (*subnatio*s), each with its group of distinctive genera, but united in the *natio* by certain mutual characters. Since, of course, evolution produces in nature all possible steps along any given line, there are also to be found some transitional or "abnormal" conditions of flower opening. In *Lobivia*, for instance, the flowers of some species remain open until they wither; others close during the night, while still others begin to open in the afternoon. Similarly, in *Eucarnegiea* the flowers begin to open during the night, as Peebles has shown, but are still fully open the next day. In this connection it

²Even some *Echinocereus* species which are regarded as nocturnal may actually be diurnal. Thus, though the flowers may close at mid-day if in full sun, their "highest stand" may be diurnal. In the shade they may remain open.

¹Dedicated to Yale Dawson with my thanks for his cooperation in preparing the English version.

must be stated that for the purposes of this classificatory system distinctions are based, as Porsch has proposed, on the "highest stand of flowering" (Blütenhochstand). This seems to be the only practicable way. Other methods either fail to recognize all characteristics exactly, or are illogical. Castellanos (1943), for instance, has united *Echinopsis*, *Lobivia* and *Acanthocalycium*, but separated *Trichocereus*. *Trichocereus*, however, is transitional to *Echinopsis*, and both are nocturnal, whereas according to the highest stand of flowering *Lobivia* and *Acanthocalycium* are diurnal. This means that if we unite *Lobivia*, *Acanthocalycium* and *Echinopsis* we must also combine *Trichocereus*. Surely this cannot be the way toward a satisfactory classification which must show exactly the whole fan of morphological groups and the differentiating characters of each.

Finally, the system of classification here presented not only permits the division of the whole family into natural groups of close relationship, but it also makes it obvious that each of these groups has a rather limited areal distribution. In other words, this classification also permits the clear representation of the geographical distribution of all its categories by area maps.

EXPLANATORY NOTES

The following genera erected by others are listed, but exact details or living material remain unknown to me: *Micropuntia* Daston, *Bonifazia* Standl. & Sterm., *Coloradoa* Boiss. & Davids., *Navajoa* Croizat, and *Azureocereus* Akers.

In accord with recent observations the genus *Neoevansia* Marshall has been reduced to synonymy under *Peniocereus*, and *Peruvocereus* Akers reduced under *Haageocereus*.

The names *Phyllocactus* Link and *Epiphyllum* Haw. are here used as proposed for conservation by Werdermann (1937) and listed in the *Synopsis of proposals concerning the International Rules of Botanical Nomenclature submitted to the Seventh International Botanical Congress*.

The genus *Neoporteria* Br. & R., although a genus dubium and confusum according to the 1935 *Rules*, Art. 63, 64, has been maintained for the group to which the type belongs. *Nichelia* of Bullock (1938) is rejected as invalid since the author neither gives any Latin diagnosis nor includes in his concept an exact differentiation of the characteristic flower differences: flower funnellform, rotate, with hairy tube, as opposed to *Neoporteria* Br. & R., emend. Backbg. in which the flowers have connivent inner perianth segments and a stalky, nearly naked tube. My definitive genus *Neochilenia* is here recognized as erected in 1942 to embrace these former characteristics.

The spelling of *Mamillaria* (instead of *Mamillaria*) is adopted in conformity with the 1935 *Rules*, Art. 70 of Section 13.

The spelling of *Peireskia* and *Peireskiopsis* (instead of *Pereskia* and *Pereskiopsis*) is adopted in accord with the proposal for their conservation by Janchen (1943) included among the proposals submitted to the 1950 Congress.

Since the publication of *Nova genera et subgenera* in the last issue of the Cactus and Succulent Journal, I have had the rare occasion to study *Carnegiea* (*Rooksbya*) *euphorbioides* in flower. The flowers resemble very closely those of *C. (Eucarnegiea) gigantea* except for the occasional bristles. They are of pink color, open at about 8 o'clock in the evening and close in the early forenoon of the following day. They are fully open at midnight and are, thus, nocturnal. Earlier descriptions were incorrect in this respect. In *Eucarnegiea* the flowers begin to open about midnight and remain open through the following day. Since they seem neither to be strictly nocturnal nor strictly diurnal, perhaps one should call them semi-diurnal.

In this synopsis the categories listed without authority are my own.

A full bibliography of cited literature, including all of my publications from 1930 to date, will appear at the end of this series.

SYNOPSIS OF THE FAMILY

Familia CACTACEAE Lindley

Subfamilia I. *Peireskioideae* K. Sch.—Plants with expanded or reduced leaves; without glochids; seeds large with fragile test; flowers diurnal.

Tribus 1. *Peireskieae*—Plants with expanded, midribbed leaves and arborescent habit.

1. *Peireskia* Plum.

2. *Rhodocactus* (Berg.) Knuth

Tribus 2. *Maihueniae*—Plants with reduced leaves lacking a midrib and of caespitose habit.

3. *Maihuenia* Phil.

Subfamilia II. *Opuntioideae* K. Sch.—Plants with expanded or reduced leaves; with glochids, at least in flowering areoles.

Tribus 1. Phyllopuntieae—Plants with succulent, expanded leaves; flowers diurnal.

4. *Quiabentia* Br. & R.

5. *Peireskiopsis* Br. & R.

Tribus 2. Euopuntieae—Plants with terete leaves; flowers diurnal.

Subtribus 1. Cyliindropuntiinae—Vegetative segments cylindrical, if globular not constantly so in cultivation.

Natio 1. Austrocyliindropuntiae—Spines sheathless.

6. *Austrocyliindropuntia* Backbg.

7. *Pterocactus* K. Sch.

Natio 2. Boreocyliindropuntiae—Spines with sheaths, at least when young. (Sheath character not recorded in *Marenopuntia*.)

8. *Cylindropuntia* (Engelm.) Knuth

9. *Grusonia* F. Reichb.

10. *Marenopuntia* Backbg.

Subtribus 2. Sphaeropuntiinae—Vegetative segments clavate or globular, or reduced cylindrical; constant in cultivation.

Natio 1. Austrosphaeropuntiae—Globular forms; some *Tephrocactus* species reduced cylindrical; South America.

11. *Tephrocactus* Lem.

12. *Maibueniopsis* Speg.

Natio 2. Boreosphaeropuntiae—Globular-clavate forms; North America.

13. *Corynopuntia* Knuth

14. *Micropuntia* Daston

Subtribus 3. Platyopuntiinae—Plants with flattened segments.

Natio 1. Brasiliopuntiae—Arboreal with a central axis and verticillate branches; flowers with staminodia; a few woolly seeds in the fruits.

15. *Brasiliopuntia* (K. Sch.) Berg.

Natio 2. Platyopuntiae—Of variable branching; flowers without staminodia; fruits with many, non-woolly seeds.

16. *Opuntia* (Tournef.) Mill.

Pars 1. Australes

Pars 2. Boreales

Natio 3. Consoleae—Central axis indeterminate, without joints; lateral branches often tetrastichous (cruciform), not verticillate; flowers with a swollen, modified style-base.

17. *Consolea* Lem.

Natio 4. Nopaleae—Without a central axis; with elongated segments; flowers scarcely opening, with exerted stamens and style.

18. *Nopalea* S.-D.

Tribus 3. Pseudopuntieae—Segments smooth, cylindrical, with minute, reduced leaves; flowers with staminodia and reflexed petals, nocturnal.

19. *Tacinga* Br. & R.

Subfamilia III. Cereoideae K. Sch.—Plants without leaves; without glochids.

Tribus 1. Hylocereeae—Plants with aerial roots; epiphytic or semi-epiphytic, or semiaërial.

Subtribus 1. Rhipsalidinae—Epiphytic, bushy, with rather small fruits and cylindrical, angled or flattened segments (the latter more or less midribbed) usually with determinate growth; flowers diurnal.

Natio 1. Rhipsalides—Flowers lateral.

Subnatio 1. Eurhipsalides—Segments terete, angled or flattened and more or less midribbed; flowers tubeless.

20. *Rhipsalis* Gaertn.

Subg. 1. *Eurhipsalis* K. Sch.

Subg. 2. *Ophiorhipsalis* K. Sch.

Subg. 3. *Goniorhipsalis* K. Sch.

Subg. 4. *Phyllorhipsalis* K. Sch.

21. *Lepismium* Pfeiff.Subg. 1. *Eulepismium* KnuthSubg. 2. *Calamorbipalis* K. Sch.Subg. 3. *Epallagonium* K. Sch.Subg. 4. *Trigonorbipalis* Berg.Subnatio 2. *Pseudorbipalides*—Segments flat and midribbed; flowers with short tubes.22. *Acanthorbipalis* (K. Sch.) Br. & R.23. *Pseudorbipalis* Br. & R.Natio 2. *Epiphylloides*—Flowers apical.Subnatio 1. *Mediorbipalides*—Segments cylindrical or angled; areoles superficial or marginal on the segments; flowers not especially modified.24. *Hariota* DC.25. *Erythrorbipalis* Berg.26. *Rbipalidopsis* Br. & R.Subnatio 2. *Epiphyllanthi*—Segments discoid (or elongated); areoles superficial, not confined to margins; flowers highly modified.27. *Epiphyllanthus* Berg.Subnatio 3. *Epiphylli*—Segments flat, with more or less marked midrib and marginal areoles; flowers showing a developmental line from small and short tubed to highly modified.28. *Pseudozygocactus* Backbg.29. *Epiphyllopsis* Berg.30. *Schlumbergera* Lem.31. *Epiphyllum* Haw. (*Zygocactus* K. Sch.)Subtribus 2. *Phyllocactinae*—Plants with flattened, elongated, indeterminate segments with a midrib; flowers diurnal and nocturnal.Natio 1. *Phyllocacti*—As above.Subnatio 1. *Euphyllocacti*—With ordinary infundibuliform flowers.32. *Marniera* Backbg. -diurnal33. *Lobeira* Alex. -diurnal34. *Phyllocactus* Link -diurnal and nocturnal35. *Nopalxochia* Br. & R. -diurnal36. *Eccremocactus* Br. & R. -nocturnalSubnatio 2. *Wittiae*—With variously modified or specialized flowers.37. *Chiapasia* Br. & R. -diurnal38. *Disocactus* Lindl. -diurnal39. *Bonifazia* Standl. & Stern. -nocturnal40. *Wittia* K. Sch. -nocturnalSubtribus 3. *Hylocereinae*—Plant bodies ribbed or angled, only occasionally so in more modified *Strophocactus*; flowers prominently tubed.Natio 1. *Strophocerei*—Flowers large; tube long, slender, with more or less stiff bristles; fruit spiny or with stiff bristles; forms modified by flattening or with thin, wing-like ribs for epiphytic growth in dense, tropical forest situations.Subnatio 1. *Nyctostrophocerei*—Flowers nocturnal.41. *Strophocactus* Br. & R.Subnatio 2. *Heliostrophocerei*—Flowers diurnal.42. *Deamia* Br. & R.Natio 2. *Nyctohylocerei*—Showing a reduction line from bristly or spiny flowers to naked ones; plant bodies multiribbed or angled; flowers nocturnal.Subnatio 1. *Selenicerei*—Plant bodies angled or multiribbed; flowers bearing spines or more or less stiff bristles.43. *Werckleocereus* Br. & R.44. *Selenicereus* (Berg.) Br. & R.45. *Weberocereus* Br. & R.46. *Mediocactus* Br. & R.

Subnatio 2. Hylocerei—Plant bodies only angled; flowers naked or nearly so.

47. *Wilmattea* Br. & R.

48. *Hylocereus* (Berg.) Br. & R.

Natio 3. Heliohylocerei—Plants with slender, multiribbed, cylindrical, pendant branches; flowers diurnal.

49. *Aporocactus* Lem.

Tribus 2. Cereae Br. & R., emend. Backbg.—Without aerial roots; terrestrial except *Pfeiffera* which is rupestral or even epiphytic.

Semitribus 1. Austrocereae—The austral branch.

Subtribus 1. Austrocereinae—Cereoid forms (elongated) at least in age, except *Pseudolobivia* which is the most reduced stage.

Natio 1. Pfeifferae Berg.—Plants rather small rupestral or epiphytic bushes; ovary and fruits spiny; flowers diurnal.

50. *Pfeiffera* S.-D.

Natio 2. Milae—Plants cereoid but low, caespitose, of divergent branching, weak bodied; flowers and fruits small, both nearly naked; flowers symmetrical, diurnal.

51. *Mila* Br. & R.

Natio 3. Corryocerei—Plants larger, more erect; flower tubes, ovaries and fruits spiny, or at least fruits spiny; flowers symmetrical, in some genera rather narrow.

Subnatio 1. Heliocorryocerei—Flowers mostly without special modification, in *Neocardenasia* rather narrow, diurnal.

52. *Corryocactus* Br. & R.

53. *Erdisia* Br. & R.

54. *Neocardenasia* Backbg.

55. *Neoraimondia* Br. & R.

Subnatio 2. Nyctocorryocerei—Flowers very narrow, nocturnal.

56. *Armatocereus* Backbg.

57. *Brachycereus* Br. & R.

Natio 4. Gymnanthocerei—Plants larger, erect, cereoid; flower tubes, ovaries and fruits essentially naked (*Jasminocereus* nearly so); flowers symmetrical, nocturnal.

58. *Jasminocereus* Br. & R.

59. *Stetsonia* Br. & R.

60. *Browningia* Br. & R.

61. *Gymnanthocereus* Backbg.

Natio 5. Loxanthocerei—Flowers asymmetrical or otherwise highly modified, in the most modified stage, *Morawetzia*, from an apical cephalium.

Subnatio 1. Euloxanthocerei—Flowering plants always cereoid; flower tubes and ovaries hairy.

62. *Clistanthocereus* Backbg.

63. *Azureocereus* Akers

64. *Loxanthocereus* Backbg.

65. *Borzicactus* Ricc.

66. *Seticereus* Backbg.

67. *Cleistocactus* Lem.

68. *Oreocereus* (Berg.) Ricc.

69. *Morawetzia* Backbg.

Subnatio 2. Brachyloxanthocerei—Young flowering plants reduced, becoming cereoid only in age; flower tubes and ovaries hairy except *Matucana* in which they are naked.

70. *Denmoza* Br. & R.

71. *Arequipa* Br. & R.

72. *Matucana* Br. & R.

Natio 6. Trichocerei Berg., emend Backbg.—Plants mostly erect, (except a more reduced? *Chamaecereus* species which is dwarfish and caespitose), cereoid in

form (except the extremely reduced stage, *Pseudolobivia*); flowers symmetrical; tube and ovary more or less hairy or woolly (except intermediate *Philippicereus* which has slender bristles).

Subnatio 1. Nyctotrichocerei—Flowers nocturnal.

- 73. *Philippicereus* Backbg.
- 74. *Setiechinopsis* Backbg.
- 75. *Trichocereus* (Berg.) Ricc.
 - Subg. 1. *Eutrichocereus* Backbg.
 - Subg. 2. *Medioenlychnia* Backbg.
- 76. *Eulychnia* Phil.
- 77. *Haageocereus* Backbg.
- 78. *Roseocereus* Backbg.
- 79. *Weberbauerocereus* Backbg.
- 80. *Echinopsis* Zucc.

Subnatio 2. Heliotrichocerei—Flowers diurnal.

- 81. *Helianthocereus* Backbg.
 - Subg. 1. *Eubelianthocereus* Backbg.
 - Subg. 2. *Neobelianthocereus* Backbg.
- 82. *Chamaecereus* Br. & R.
- 83. *Pseudolobivia* Backbg.

Subtribus 2. Austrocactinae—Plant bodies commonly reduced to more or less cactoid (globular) forms; flowers diurnal.

Natio 1. Lobiviae—Forms representing a line of reduction from trichocereoid forms to globular forms, and from woolly and (or) bristly tubes and woolly or spiny fruits to naked tubes and fruits; flowers more nearly resembling trichocereoid flowers with a tendency for lateral and basal flowering and branching.

Subnatio 1. Eriolobiviae—Tubes with hairs, without bristles; fruits hairy and spiny in *Acantholobivia*, otherwise only hairy.

- 84. *Acanthocalycium* Backbg.
- 85. *Acantholobivia* Backbg.
- 86. *Lobivia* Br. & R.
 - Subg. 1. *Eulobivia* Backbg.
 - Subg. 2. *Neolobivia* Backbg.

Subnatio 2. Chaetolobiviae—Tubes and fruit with hairs and bristles.

- 87. *Mediolobivia* Backbg.
 - Subg. 1. *Pygmaeolobivia* Backbg.
 - Subg. 2. *Eumediolobivia* Backbg.
- 88. *Aylostera* Speg.

Subnatio 3. Gymnolobiviae—Tubes and fruits naked.

- 89. *Rebutia* K. Sch.
 - Subg. 1. *Eurebutia* Backbg.
 - Subg. 2. *Neorebutia* Bowerunge

Natio 2. Austroechinocacti—Flowers generally short-tubed, not trichocereoid, arising from near or at the apex, mostly with a tendency toward simple form; with a reduction-line of flower vestment from spininess to nakedness.

Ramus 1. Orientales-cordillerarum.

- 90. *Austrocactus* Br. & R.
- 91. *Pyrrhocactus* Berg.
- 92. *Brasilicactus* Backbg.
- 93. *Parodia* Speg.
- 94. *Malacocarpus* S.-D.
- 95. *Eriocactus* Backbg.
- 96. *Notocactus* (K. Sch.) Berg., emend.
 - Backbg.
 - Subg. 1. *Eunotocactus* Backbg.
 - Subg. 2. *Neonotocactus* Backbg.
- 97. *Frailea* Br. & R.

- 98. *Blossfeldia* Werd.
- 99. *Soebrensia* Backbg.
- 100. *Oroya* Br. & R.
- 101. *Neowerdermannia* Fric.
- 102. *Weingartia* Werd.
- 103. *Brachycalycium* Backbg.
- 104. *Gymnocalycium* Pfeiff.

Ramus 2. Occidentales-cordillerarum.

- 105. *Neochilenia* Backbg.
- 106. *Horridocactus* Backbg.
- 107. *Reicheocactus* Backbg.
- 108. *Neoporteria* Br. & R.
- 109. *Eriosyce* Phil.
- 110. *Islaya* Backbg.
- 111. *Copiapoa* Br. & R.

Semitribus 2. Boreocereae—The boreal branch.

Subtribus 1. Boreocereinae—Cereoid forms (elongated) at least in age, except Cephalocacti which represent a reduced sideline.

Natio 1. Leptocerei Berg.—Flowers tending to be simply organized, with stout, spiny and (or) felty tubes with a tendency toward reduction of the spines to bristles or nakedness.

Subnatio 1. Heliocerei—Flowers diurnal.

- 112. *Leptocereus* (Berg.) Br. & R.

Subnatio 2. Nyctoleptocerei—Flowers nocturnal.

- 113. *Acanthocereus* (Berg.) Br. & R.
- 114. *Peniocereus* (Berg.) Br. & R.
- 115. *Dendrocereus* Br. & R.
- 116. *Neoabbottia* Br. & R.

Natio 2. Leocerei—Flowers small, with densely scaly tubes with hairs and (or) bristles; all nocturnal?

- 117. *Leocereus* Br. & R. -nocturnal?
- 118. *Zebntnerella* Br. & R. -nocturnal

Natio 3. Echinocerei—Weak bodied plants with gummy flesh and mostly rather large flowers with more or less bristly spines.

- 119. *Wilcoxia* Br. & R. -diurnal
- 120. *Echinocereus* Engelm. -diurnal and nocturnal (truly?)

Natio 4. Nyctocerei Berg., emend. Backbg.—Plants with slender bodies and slender tubed flowers, the flowers showing a reduction-line from spines to stiff bristles to hairs.

- 121. *Nyctocereus* (Berg.) Br. & R.
- 122. *Eriocereus* (Berg.) Ricc.
- 123. *Harrisia* Britton
- 124. *Arthrocerus* Berg.
- Subg. 1. *Enarthrocereus* Backbg.
- Subg. 2. *Cutakia* Backbg.

Natio 5. Heliocerei—Plants with slender, elongated but often heavy branches, tending to be decumbent; flowers diurnal (all?), with more or less slender tube and spiny ovary and fruit.

- 125. *Heliocereus* (Berg.) Br. & R.
- 126. *Bergerocactus* Br. & R.
- 127. *Machaerocereus* Br. & R. -nocturnal?
- 128. *Rathbunia* Br. & R. (a specialized sideline with respect to the flowers which have narrow tubes and oblique limbs).

Natio 6. Pachycerei Berg., emend. Backbg.—Plants of large, columnar or candelabra form, except *Hertrichocereus* (a reduced sideline?), including a

developmental line from spiny to naked flowers and progressive modification of the flowering zone toward a terminal cephalium, the latter members of this line (except some *Pilocereus* species) being a northern counterpart of the southern Cephalocerei.

Subnatio 1. Heliopachycerei—Flowers diurnal.

- 129. *Stenocereus* Ricc.
- 130. *Isolatocereus* Backbg.
- 131. *Anisocereus* Backbg.
- 132. *Pachycereus* (Berg.) Br. & R.
- 133. *Hertrichocereus* Backbg.
- 134. *Polaskia* Backbg.
- 135. *Escontria* Rose

Subnatio 2. Nyctopachycerei—Flowers nocturnal (in Subgenus 1 of *Carnegiea* semidiurnal).

- 136. *Carnegiea* Br. & R.
- Subg. 1. *Eucarnegiea* Backbg.
- Subg. 2. *Rooksbya* Backbg.
- 137. *Marshallocereus* Backbg.
- 138. *Ritterocereus* Backbg.
- 139. *Lemaireocereus* Br. & R.
- 140. *Mitrocereus* Backbg.
- 141. *Neodawsonia* Backbg.
- 142. *Cephalocereus* Pfeiff., emend. Backbg.
- 143. *Haseltonia* Backbg.
- 144. *Neobuxbaumia* Backbg.

Natio 7. Polyanthocerei—Erect cerei with a tendency to produce several flowers from one areole; flowers with reduced limb and (or) tube.

Subnatio 1. Heliopolyanthocerei—Flowers diurnal.

- 145. *Marginatocereus* Backbg.
- 146. *Myrtillocactus* Cons.

Subnatio 2. Nyctopolyanthocerei—Flowers nocturnal.

- 147. *Lophocereus* (Berg.) Br. & R.

Natio 8. Gymnocerei Berg., emend. Backbg.—Erect, arborescent or bushy plants with infundibuliform, naked flowers; flowers nocturnal.

- 148. *Brasilicereus* Backbg.
- 149. *Monvillea* Br. & R.
- Subg. 1. *Eumonvillea* Backbg.
- Subg. 2. *Ebneria* Backbg.
- Subg. 3. *Hummelia* Backbg.
- 150. *Cereus* Mill.
- Subg. 1. *Eucereus* Backbg.
- Subg. 2. *Neocereus* Backbg.

Natio 9. Cephalocerei—South American counterpart (except some *Pilocereus* species) of the northern Pachycerei, with modified inflorescence zones; flowers nocturnal.

Subnatio 1. Acephalocerei—Flowering areoles only more or less woolly.

- 151. *Subpilocereus* Backbg.
- 152. *Pilocereus* K. Sch.
- Subg. 1. *Mediopilocereus* Backbg.
- Subg. 2. *Eupilocereus* Backbg.

Subnatio 2. Hemicephalocerei—With a pseudocephalium.

- 153. *Micranthocereus* Backbg.

Subnatio 3. Eucephalocerei—With a true cephalium, apical in some.

- 154. *Facheiroa* Br. & R.
- 155. *Vatricania* Backbg.
- 156. *Thrixanthocereus* Backbg.
- 157. *Pseudoespostoa* Backbg.
- 158. *Neobinghamia* Backbg.

- 159. *Espostoa* Br. & R.
- 160. *Austrocephalocereus* Backbg.
- 161. *Coleocephalocereus* Backbg.
- 162. *Stephalocereus* Berg.
- 163. *Arrojadoa* Br. & R.

Natio 10. Cephalocacti—Reduced globular forms with apical cephalium.

Subnatio 1. Heliocephalocacti—Flowers small, short-tubed, diurnal.

- 164. *Melocactus* Link & Otto

Subnatio 2. Nyctocephalocacti—Flowers rather large, long-tubed, nocturnal.

- 165. *Discocactus* Pfeiff.

Subtribus 2. Boreocactinae—Globular forms (some elongated); northern counterpart of Austrocactinae; flowers diurnal.

Natio 1. Boreoechinocacti—Flowers from areoles, not from grooves or axils.

Subnatio 1. Euboreoechinocacti—Flowering from areoles which are not particularly elongated; without glands; without watery fruits.

- 166. *Echinocactus* Link & Otto
- 167. *Astrophytum* Lem.
 - Subg. 1. *Euastrrophytum* Backbg.
 - Subg. 2. *Neoastrrophytum* Backbg.
- 168. *Homalocephala* Br. & R.
- 169. *Toumeyia* Br. & R.
- 170. *Leuchtenbergia* Hooker
- 171. *Neogomesia* Cast.
- 172. *Sclerocactus* Br. & R.
- 173. *Ferocactus* Br. & R.
- 174. *Hamatocactus* Br. & R.
- 175. *Echinofossulocactus* Lawr.
- 176. *Utahia* Br. & R.
- 177. *Coloradoa* Boiss. & Davids.
- 178. *Pediocactus* Br. & R.
- 179. *Echinomastus* Br. & R.
- 180. *Thelocactus* (K. Sch.) Br. & R.
- 181. *Strombocactus* Br. & R.
- 182. *Obregonia* Fric.
- 183. *Lophophora* Coult.
- 184. *Turbinocarpus* Backbg. & Buxb.
- 185. *Aztekium* Boed.
- 186. *Gymnocactus* Backbg.
- 187. *Epithelantha* Web.
- 188. *Navajoa* Croiz.

Subnatio 2. Mediocoryphanthae—Plants showing intermediate characters between Euboreoechinocacti and Coryphanthae, either by glands or watery fruits with soft seeds, and by flowers from base of elongated areoles.

- 189. *Glandulicactus* Backbg.
- 190. *Ancistrocactus* Br. & R.

Natio 2. Mamillariae—Flowering from tubercular grooves or axils.

Subnatio 1. Coryphanthae—Flowering from grooves or their rudiments.

- 191. *Neolloydia* Br. & R.
 - Subg. 1. *Euneolloydia* Backbg.
 - Subg. 2. *Cumarinia* Knuth
- 192. *Neobesseya* Br. & R.
- 193. *Escobaria* Br. & R.
- 194. *Lepidocoryphantha* Backbg.
- 195. *Coryphantha* Lem.
 - Subg. 1. *Eucoryphantha* Backbg.
 - Subg. 2. *Neocoryphantha* Backbg.
- 196. *Roseocactus* Berg.

197. *Encephalocarpus* Berg.
 198. *Pelecyphora* Ehrenbg.
 Subnatio 2. *Eumamillariae*—Flowering from the axils of the tubercles.
 199. *Solisia* Br. & R.
 200. *Ariocarpus* Scheidw.
 201. *Mamillaria* Haw.
 202. *Porfiria* Boed.
 203. *Dolicothele* (K. Sch.) Br. & R., emend.
 Backbg.
 204. *Krainzia* Backbg.
 205. *Pbellosperma* Br. & R.
 206. *Bartschella* Br. & R.
 207. *Mamilloopsis* (Morren) Web.
 208. *Cochemiea* (K. Brand.) Walton

EDITOR'S NOTE: The next issue will begin Part 2 of an annotated list of Mr. Backeberg's new genera, species, varieties, and combinations since 1930. This is one of the most valuable contributions that has ever been run in this magazine and it should be of great help in tracing many of the names now found in cactus literature.

HELIOTROPISM OF CACTI

By F. B. NOYES, Vacaville, Calif.

A pleasant diversion in anyone's cactus garden is to build a comfortable seat for rest and reflection, where the mind can wander away from personal and world affairs to the habits of plants. A person can travel far in this way, and once in a while he will chance upon an old fact of science, demonstrated by a new model; that is, one of his cacti.

In front of my bench is a young *Trichocereus pasacana*, grown from seed, and now a foot in diameter, five feet tall. The longest of the three central spines reaches six inches. As the time of day goes by, they change their posture to a marked degree.

This was not realized at first. My mind was either vacant and at rest, or wool-gathering, but one day it dawned on me that the spines on the sunny side of the cactus were not pointing where they did before.

Heliotropism is explained in the dictionary as "Involuntary movement of an organism, or its parts, due to the sun's rays." Briefly, phototropism caused by the sun.

This is commonly seen in flowering plants as the opening and closing of their flowers. In this category there are more day blooming cacti than night blooming, though some stay open continuously like *Echinocereus triglochidiatus*, *E. Salm-Dyckianus*, and others. Night bloomers, *Cerei*, close in the daytime except when cloudy, or possibly during an eclipse.

Another example of heliotropism is the way

Echinocacti and *Ferocacti* lean to the south southwest. I have straightened up a *Ferocactus acanthodes* in June on three successive years, but by the end of each summer it had grown back to its natural leaning position. A peculiar reverse effect takes place with *Trichocereus Schickendantzii*, which both leans and grows northward; these growth movements are permanent.

The third type is not so noticeable because turgor movements of cactus spines take place in few species. Most of these move with so small an amplitude that it can be measured only by a protractor. Those which move their spines ordinarily are scarce indeed.

Trichocereus pasacana is the best example I know in this last class. On young growth, one or two years old, the spine changes are really surprising. After four years, these responses to the sun gradually stop, and the spines become set in a deflected position at right angles to the sun's rays, during the hottest part of the day, which is approximately 2:00 P. M.

Lemaireocereus Hollianus shows slight changes of the spines on the south side. They are a little more deflexed than those of the north.

Returning to *Trichocereus pasacana*, the spines change from a porrect to deflexed position daily, faster in spring than summer. This is due to the greater sap content of the plant cells, and consequently a more flexible condition of the spines' complete change takes place during the first attachment mechanism to the plant body. The



FIG. 78. *Trichocereus pasacana* (left) and *Lemaireocereus Hollianus* (right) show heliotropism of the spines.

hour after sunrise in spring, and the first two hours in late summer. After sunset the return from deflexed to porrect position takes longer.

William Taylor Marshall has written about heliotropism (although he did not call it by name) in the April, 1948, Saguaroland Bulletin. He gave examples of body posture and position

changes of flower buds in *Carnegiea*, *Echinocereus*, *Ferocactus*, *Schlerocactus*, *Thelocactus*, and others, but did not mention spine movement.

There may be more than at first meets the eye in this self-expression of our cacti.



QUESTIONS and ANSWERS

Conducted by
HARRY JOHNSON
Paramount, Calif.

Question: I am not sure about the "resting" of the three kinds I have: Cacti, Succulents and Epiphyllums. Do they need the same tempera-

ture, rest and water? I have an airy light, small room with a northern aspect I shall dedicate to their wintering. I am bothered with cochineal and small fluffy white patches in the joints of the plants. Since it is not possible to get suitable sprays, is there anything I can do? Mrs. Marjorie Munden, Madrid, Spain.

Answer: The resting of these plants is simple in its general phases. As one becomes more acquainted with the various plants he will discover many exceptions and modify the treat-

ment to fit. My method is to utilize to the fullest the climatic conditions of the region where I happen to be. In other words do not try too hard to create particular conditions you feel some particular plant has to have. Don't start your plants into growth too early in the spring. After March when the days definitely get longer and brighter give a little more water. You may treat the three groups somewhat the same. The Succulents and Epiphyllums should not get too dry. When they do begin to grow keep them moving slowly giving all the light possible. Give as much fresh air as possible. This is very important. Your cacti will go on growing all summer. The Epiphyllums will also. The Mexican Succulents such as *Echeveria*, *Sedum*, *Pachyphytum* will also keep on. The South African genera as *Crassula*, *Stapelia*, *Kalanchoe*, *Ha worthia*, etc., will grow slowly also. However, this is their natural resting period and if watered too freely in hot weather they may suddenly collapse. The Mesembs as *Lithops*, *Dinteranthus*, *Titanopsis*, *Fenestraria*, etc., will resent being pushed during late June, July and August. Better let them remain on the dry side in an airy place. If they have a tendency to sunburn a little shade is desirable. In the fall as the days become cooler many plants including Cacti will spurt into growth. Most of these come from below the equator where September is spring. The Mesembs show buds, many *Crassulas* grow and root freely; often *Lobivias* will flower again. Those that seem to want to grow, allow a little more water. If light is bad and the weather wet and sullen don't let growth start for it will be weak and you are quite likely to lose them. The best night indoor temperatures range from 50° to 60°. One should always remember the lower the temperature the less water will be needed. The plants will not shrivel so quickly nor the soil dry out so fast. This is all to the good so far as the plants are concerned. Some of the hardier plants as *Echinopsis*, *Lobivia*, *Notocactus*, etc., will winter well where temperatures drop to 40° at night as in a cellar or attic. Keep plants on the dry side but don't dessicate them. Watering in the morning during brighter weather is best. Lightly, of course, and see the plants are aired well so the plant (not necessarily the soil) is dry before night. If you must give higher night temperatures from 60° or more be sure to give plenty of light and watch they do not dry out too much. Just a few degrees rise in temperature makes a great difference in the speed of drying. Cacti should winter well in an airy north window. I doubt succulents will be too happy. They are liable to become "drawn."

As regards a home made spray. We used to

make an oil spray as follows: 2 cubic inches laundry soap dissolved in a half gallon of hot water. Add a teacup (6 ounces) of kerosene and shake violently to emulsify. Add cold water to make 3 gallons. When cold, spray or dip plants. This solution must be used freshly made. It will not keep. Plants with powdered, white skin or leaves will become green. Succulents are often damaged by oil sprays. One often has an Hobson's Choice of losing the plant from mealy bug or scale or damaging it by spraying with oil sprays, nicotine, pyrethrum or rotenone are not so effective on these insects but are less liable to damage the plants.

Question: How can I induce my *Echinopsis* to bloom. Although I give them full sunlight for the entire afternoon and bone meal they do nothing more than sprout pups. Should I remove the pups?

Do you know about a fungus-like disease that is destroying a small *Mammillaria* I have? White mold-like growth at the base of the tubercles causing them to wilt and dry up. Is it not the usual wet rot. I have used semesan, sulphur and alcohol to no avail. J. M. Freckleton, Utah.

Answer: Some varieties of *Echinopsis* produce a myriad of offsets to the detriment of their flowering, particularly when grown in pots. Removing the offsets sometimes helps though some varieties are certainly persistent "puppers." Give them a fertilizer with more nitrogen. Put on an inch of cowmanure next spring and I think you will be surprised at the flowers. As regards to the fungus. I don't know as I have ever seen such a thing attacking a plant. My reaction would be to give the plant all the fresh air possible. This is generally a sovereign remedy for such ailments.

Question: I have a choice of wintering my plants in my fruit cellar in a light but not sunny window with temperatures between 30° and 50° or in a sunny, south, sleeping room window never below 68°. This summer my Orchid Cactus and Queen of the Night I received in the spring have not grown but look all right. The Mexican Living Rock (*Ariocarpus*) looks very dry and the tubercles like shells. Mrs. Florence B. Pitt, Webster, N. Y.

Answer: This question is partly answered in the reply to Mrs. Munden. The fruit cellar is a little too cold I think for such things as Epiphyllum and Queen of the Night. 68° to 70° is pretty warm for many plants. Generally at such temperatures the air is excessively dry which is a main drawback. If the air is not too dry the plants could do well. Watch the watering so they do not dry too quickly and too much.

The reason the Epiphyllum and Queen of the Night failed to grow probably has to do with the rooting medium. They don't like a heavy compact soil. They luxuriate in half sand and half coarse leafmold but since a potful of this will not sustain a plant for a season one must use one part loam with it. The Mexican Living Rock has probably decayed. I find the best medium for potting these is 2 parts coarse sand, 1 part leafmold preferably oak. If deciduous leafmold is used add a pinch of lime or a handful of limestone grits. The plant naturally grows in a caliche region. Don't ever overwater them.

Question: What growing conditions are necessary to bring *Stapelia gigantea* into bloom. Rose B. White, San Rafael, Calif.

Answer: The *Stapelia*s are primarily fall bloomers but often flower during spring and summer. As they mostly flower on the young growth they blossom best when growing. They thrive best in a light sandy soil with some leafmold. The roots are impatient of standing water but when growing like a good supply. They should dry out before watering each time. To carry the extremely large flower that *Stapelia gigantea* bears, the plants generally must have 3 to 5 old stems of the preceding year, well rooted. I measured some flowers a few weeks ago, 13 inches across. The *Stapeliads* like plenty of fresh air and sunshine. If the flower buds dry up before opening a little fertilizer may help. Sometimes too, behind a closed window and in full sun, it gets extremely hot, enough so as to blast any bud.

Question: I have tried two pots of Baby Toes (*Fenestraria*) with no luck. Can you give me a little advice?

The same with *Stapelia hirsuta*. My *Cephalocereus senilis* (Old Man) has grown a full inch since I put it outside in June. It is in a 2-inch pot. Does it need a larger one. Mrs. W. J. Mahon, N. J.

Answer: The Baby Toes are really very easy to grow. I have found they only need a good circulation of air, a very sandy soil or pure sand and plenty of light. Water them in the morning so the plant dries out before night. Keep water away from them during damp or overcast days. Remember they come from one of the most arid deserts on earth—the coastal strip of S. W. Africa. They bloom in September, October, and November when their growth commences. From June 15 to September 1st, do not water very often as they are dormant. I have plants almost 20 years old that fill 6 inch pans. The growing conditions for *Stapelia hirsuta* are the same as those given above for *Stapelia gigantea*. The Old Man Cactus should be shifted to a 2½ inch

pot, using a quite sandy soil with a little charcoal mixed with it. If it dries too quickly place the pot in a larger one filled with sand.

Question: My *Aloe microstigma* is about a foot tall with quite a few offsets. Do Aloes ever bloom at this size or must they be quite large. Are there many cacti hardy in northern Ohio? You suggest *Mammillarias*, *Parodias*, *Notocactus*, and *Gymnocalycums* for Mrs. Miller's window sill. I have had good success with flowering *Gymnocalyciums* (Chin Cacti) in my kitchen window but would like to know if the other types remain open a longer time each day. Mrs. Katherine Bierman, Ohio.

Answer: The Aloes vary greatly in size from 2" across to 20 or more feet in height. (Marianne North reported seeing *Aloe Bainsii* 75' high in 1860.) *Aloe microstigma* is full grown at 12". I have about 30 seed plants about this size that have been flowering for years. Keep them outdoors during summer. They blossom in midwinter with lovely unbranched spikes of yellow and orange flowers. There are several hardy cacti, the most common ones being various native *Opuntias* which are found pretty well distributed through the U. S. However, few of any hardy species are available now. At one time I had over 29 varieties of native *Opuntias* imported from—of all places—Germany where they were much esteemed. I am trying to assemble another collection and would appreciate hearing from anyone who has a wild species growing near them.

The *Mammillarias*, *Parodias* and *Notocacti* open in the morning and remain open until late afternoon. Some *Gymnocalyciums* do not open until after 12 m.

Arizona Highways magazine for October, 1950, contained an interesting color photograph of *Carnegiea gigantea* by Lyle Hiner. The remarkable thing about the picture was that it showed the plant in bud, in flower, with ripening fruit, and with bursting fruit. When the fruit ripens and splits wide open it is often mistaken for a red flower.

Mr. A. C. Stadelman of Montreal, Canada, reports that Mrs. Choquette had some cactus plants that were badly infested with mealy bugs but when she planted them in sand, in the garden, the bugs disappeared. She believes that ants ate them or carried them away. Is that possible?

NOMEN NUDUM

Cur. Backeberg received plants and photos from Fritz Schwarz of the new species recently named by Alexander as *Nyctocereus chontalensis*. Mr. Backeberg was to have set it up as a new species under the name of *Nyctocereus oligogonus*. Mr. Schwarz may have sent out plants under this name. This same plant was noted and photographed for this JOURNAL in October, 1946, by the first discoverer, T. MacDougall.



FIG. 79. *Echinocereus Fendleri* variety, from near Benson, Arizona.

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Thelocactus bicolor is native to Texas and at one time could readily be purchased at our local dime stores. I first saw it in the wilds south of Marathon in the picturesque Big Bend Country in 1938 and the following year collected it in Coahuila, Mexico. The species is a variable one and at least two varietes are recognized. Although stems are solitary, infrequently two-headed specimens come to light. Six years ago, Mrs. Ella Nipper of Chester, Ill., exhibited a lovely double-header at one of our cactus shows in St. Louis.

Thelocactus bicolor is a globose plant, 3 to 5 inches high, and nearly as thick. It is slightly glaucous and very spiny. Eight broad, somewhat tubercled, ribs are prominent and the tubercles are grooved above, sometimes halfway or again all the way to the axils. The fairly large areoles contain numerous highly colored spines. The fourteen radial spines are first reddish with white to yellow tips, but later become nearly white. Four centrals are constant, these stouter than the radials, but somewhat angled or flattened, brownish to straw-colored and changing nearly white. The rather large, showy blossoms are borne on very young tubercles in the center of the head and are nearly 3½ inches broad when fully expanded. The brownish green, pale purplish-tinged sepals are much shorter than the beautiful violet red petals which often are streaked with pale yellow orange. The filaments are of an apricot orange to rufous color, while the anthers are lighter. The style, with twelve, deep carmine stigma lobes, is flesh colored to pinkish. Unfortunately this cactus does not adapt itself too well in cultivation and must be kept on the drier side to insure success.

Before World War II, Brazil imported most of the sisal it used. Since 1946, however, it has been able to export to the United States. Sisal got its start in Brazil during the recent war, when Far Eastern suppliers were cut off and the plantations of British East Africa, Haiti and Mexico were unable to meet the increased demand. Plantations were started especially in the State of Paraiba, whose interior consists in great part of dry, brush-covered lands. Sisal was easily acclimated. By 1946 Brazil was in position to begin exporting the fiber. Sisal is a strong, long-lasting white fiber, from two to five feet long. It comes from the leaves of *Agave sisalana* and is used for all kinds of hard-fiber cordage. Less than 3,000 tons were exported in 1946. This had grown to 19,863 in 1948, and to 23,018 in 1949. In the first quarter of 1950 Brazilian exports of sisal shot up to the all-time high of 10,983 tons. This year, if continued throughout the year, would bring the total to nearly 44,000 tons, almost double the 1949 exports.

Kleinia cephalophora and *Othonna intermedia* are two new succulent Compositae described by Prof. R. H. Compton in the October, 1949, issue of The Journal of South African Botany. The first is a small evergreen shrub, which, according to its discoverer, bears a striking resemblance to some *Cotyledon* species. Its leaves are elongated-fusiform, glabrous and glaucous throughout, and up to 4 inches long. It is strikingly distinct from all other *Kleinias* and the solitary yellow flower-

heads are of exceptional size. It is native to Namaqualand. The new *Othonna* is a deciduous herbaceous winter-flowering species with a tuberous root up to an inch in thickness. The carrot-like tuber is dark, resiniferous, constricted above and crowned at ground level with a densely white-woolly cushion from which the leaves and peduncles arise. The rather numerous, more or less spatulate, succulent, glabrous leaves are nearly three inches long. The florets are yellow. *Othonna intermedia* is said to be fairly common in the white-quartz strewn plains north of Van Rhynsdorp in the Cape Province.

The Todos Santos Islands lie west of the northern coast of Baja California, about 9 miles from Ensenada. The hilly southern island is slightly more than half a mile long and 300 feet high, while the northern island is shorter and lower. In the spring of 1948 George Lindsay and Reid Moran visited the Todos Santos Islands and collected a total of 60 species of plants. *Dudleya anomala* densely covered rocks and cliffs north and east exposures; *Dudleya attenuata* subsp. *Orcuttii* was frequent on flat area at northeast side of island; *Dudleya Bryceae* was common from sea cliffs to top of island; *Dudleya semiteres* was occasional on flat at northeast side of island; *Crassula erecta* was found in only one colony; *Euphorbia misera* was occasional; *Bergerocactus Emoryi* formed thickets at northeast end; *Mammillaria dioica* and *Opuntia occidentalis* besides the *Bergerocactus*, were the only cacti found; and *Carpobrotus chilensis* and *Cryophytum crystallinum* were common.

The Marandellas area in Southern Rhodesia is considered to be one of the best stock raising districts in the country. It is also believed to be the healthiest for residence of the white race. The vegetation of the district, like most of Rhodesia, is of the savannah type, i.e. open woodland with tall grasses beneath and between the trees. Capt. W. F. Collins raised cattle on an undeveloped farm and became convinced that certain occasional deaths among his stock could be attributed to plant-poisoning. Information as to the existence of poisonous plants in the district was meagre, so he offered prizes for the best collection of poisonous plants from the district. Gradually this led to the publication of BULLETIN No. 1514, "Poisonous Plants of the Marandellas District," which I found quite interesting. The plants described in the booklet included a kalanchoe, a euphorbia and a sarcostemma. *Kalanchoe thyrsiflora*, a fairly common plant restricted almost entirely to granite kopjes, bears an inflorescence which proved poisonous to sheep. About 1½ lbs. were sufficient to cause death in 7½ hours. *Euphorbia ingens*, a tree 20 to 30 ft. tall, contains an abundant milky latex in all its parts which is strongly irritant, and causes blistering of the skin and mucous membranes. If cattle are driven through dense bush containing this tree they may suffer severe eye-burn, and severe burning on facial skin. *Sarcostemma viminalis*, a succulent, trailing, leafless milkweed also contains a copious milky latex. One or two pounds of either fresh or dried plant has been proven to be sufficient to kill a sheep in a day or two.

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CACTUS CATALOG

Cactus Pete, 5440-C Valley Boulevard, Los Angeles, California, has available his Catalogue No. 3, price 25c. This 48-page book contains valuable information about Epiphyllum hybrids or the "Orchid Cacti." Although the listing is chiefly on Epiphyllums, other related plants are available such as Rhipsalis, Pseudorhipsalis, Disocactus, Chiapasia, Nopalxochia, Lepismium, Heliocereus, and Hylocereus. The catalogue is well illustrated with some other plates. Send for your copy now.

EPIPHYLLUM HANDBOOK

This is to announce that this book is now removed from the wholesale list because the edition is practically sold out and there are no plans for a reprint. If you do not have a copy, it is available at \$4.00 postage paid (plus sales tax in California).

NEW CACTUS BOOK

Wm. Taylor Marshall announces the publication of his new book, "Arizona Cactuses" about December 1. There will be about 100 pages and all the species of cacti native to Arizona will be described in non-technical language with photographs or line drawings of each species. Non-technical keys will aid the student in identifying the cacti found in the field. Printed on excellent quality of paper with large readable type. Price \$1.00, postage 15c. Order now from Abbey Garden Press, 132 W. Union Street, Pasadena, Calif.

ENGLAND REPRESENTATIVE

The Cactus and Succulent Society of America and Abbey Garden Press have appointed Mr. E. Lamb to take subscriptions to the JOURNAL and to supply books to our friends in England. Address W. T. Neale and Co., Franklin Road, Worthing, Sussex, England.



NEW BOOKS

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<i>Morphology of Cacti</i> —Buxbaum... 2.75 2.90 (Now available)		
<i>Arizona Cactuses</i> —Marshall..... 1.00 1.15 (Available in December)		
<i>Stachlige Wildnis</i> —Backeberg..... 5.00 (Available in January)		
<i>Cactus-like Succulents</i> —Lamb..... 1.05		

Please add sales tax in California.

Succulent Plants Illustrated is the title of the new book by the well-known Vera Higgins, author of *The Study of Cacti* and many translations. There are 72 pages 7x10 inches including 24 full pages of drawings by the author; 130 different plants are illustrated so that beginners can quickly identify their succulents. For one handy with water colors, these plants are perfectly reproduced for hand coloring. The object of the book is to give some idea of the variety to be found amongst succulent plants, and because it is not always easy to picture a plant from a written description, illustrations are the chief feature. The accompanying text tells briefly how plants are related to each other, where they grow and how they can be cultivated. Copies are available for immediate delivery at \$2.50 postpaid (\$2.60 in California).

Backeberg's *B. F. K. (Blatter zur Kakteenforschung)*. This bulletin of cactus research was published between 1934 and 1938 and contains 460 pages and 250 photos. Each cactus is described in English. The most valuable material since Britton and Rose. Absolutely necessary for those studying classification. Unbound \$4.95, foreign \$5.15.

"The Enigma of the Origin of Monstrosity and Cristation in Succulent Plants" by J. J. Verbeek Wolthuys is now available as reprinted in Holland. The 112 page book is printed in two languages—Dutch on one page and English on the opposite page. There are 27 illustrations. The final word on the causes of monstrose and cristate plants has not been written but this book discusses the many and varied theories. Postpaid \$1.00.

THE CACTUS JOURNAL OF GREAT BRITAIN

This valuable magazine was published quarterly with the first issue of Sept., 1932. The magazine was temporarily discontinued after the December issue in 1939. It will be impossible to ever obtain a complete set but we offer the 25 issues that are available (over six years' issues) \$22.00 postpaid.

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